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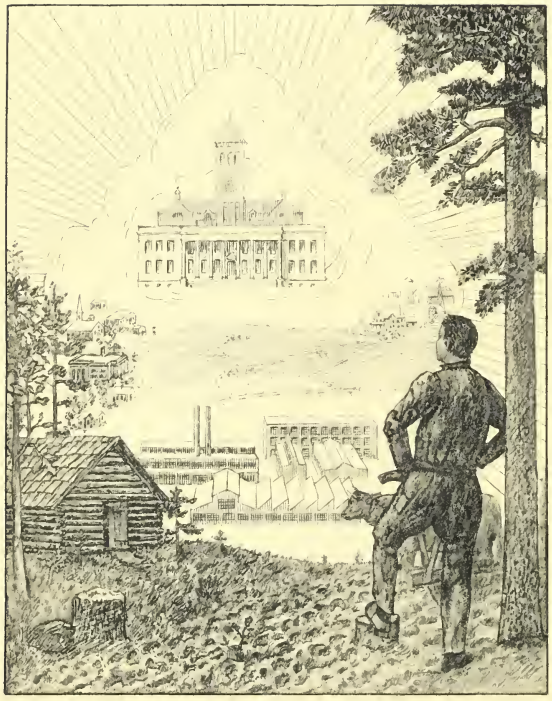

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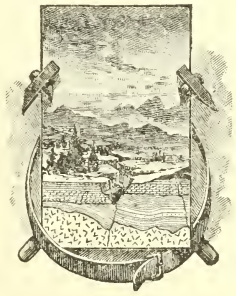
WATER-SUPPLY PAPERS

Nos. 301-303



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Same 302; Surface water supply of United States, 1911, pt. 2, South Atlantic Coast and eastern Gulf of Mexico drainage basins.

Same 303; Surface water supply of United States, 1911, pt. 3, Ohio River basin.

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, DIRECTOR

WATER-SUPPLY PAPER 301

SURFACE WATER SUPPLY OF THE UNITED STATES

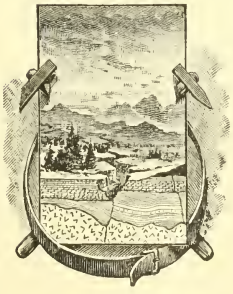
1911

PART I. NORTH ATLANTIC COAST

PREPARED UNDER THE DIRECTION OF M. O. LEIGHTON

BY

C. C. BABB, C. C. COVERT, AND R. H. BOLSTER



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SURFACE WATER SUPPLY OF THE NORTH ATLANTIC COAST, 1911.

By C. C. Babb, C. C. Covert, and R. H. Bolster.

AUTHORIZATION OF WORK.

This volume is Part I of a series of twelve reports presenting results of measurements of flow made on certain streams in the United States during the calendar year 1911. The reports are listed in the following table:

Papers on surface water supply of the United States, 1911.

Part.[a]	No.	Title.
I	301	North Atlantic coast.
II	302	South Atlantic coast and eastern Gulf of Mexico.
III	303	Ohio River basin.
IV	304	St. Lawrence River basin.
V	305	Upper Mississippi River and Hudson Bay basins.
VI	306	Missouri River basin.
VII	307	Lower Mississippi River basin.
VIII	308	Western Gulf of Mexico.
IX	309	Colorado River basin.
X	310	Great Basin.
XI	311	Pacific coast in California.
XII	312	North Pacific coast.

[a] For the purpose of uniformity in the presentation of reports, a general plan has been agreed upon by the United States Reclamation Service, the United States Forest Service, the United States Weather Bureau, and the United States Geological Survey, according to which the area of the United States has been divided into 12 parts, whose boundaries coincide with natural drainage lines indicated by the parts of the report.

The data presented in these reports were collected by the United States Geological Survey under authority implied in the organic law (20 Stat. L., p. 394) which contains the following paragraph:

Provided, That this officer [the Director] shall have the direction of the geological survey and the classification of public lands and examination of the geological structure, mineral resources, and products of the national domain.

The work was begun in 1888 in connection with special studies of water supply for irrigation.

Since the fiscal year ending June 30, 1895, successive sundry civil bills passed by Congress have carried the following item and appropriations:

For gaging the streams and determining the water supply of the United States, and for the investigation of underground currents and artesian wells, and for the preparation of reports upon the best methods of utilizing the water resources.

Annual appropriations for the fiscal year ending June 30—

1895	$12,500
1896	20,000
1897 to 1900, inclusive	50,000
1901 to 1902, inclusive	100,000
1903 to 1906, inclusive	200,000
1907	150,000
1908 to 1910, inclusive	100,000
1911 to 1913, inclusive	150,000

In the execution of the work various private and State organizations have cooperated. Acknowledgments for such cooperation is made on page 15, and also in connection with the description of each station affected by the cooperative work.

PUBLICATIONS.

Measurements of stream flow have been made at more than 2,000 points in the United States and also at many points in small areas in Seward Peninsula and the Yukon-Tanana region, Alaska, and in the Hawaiian Islands. During 1911 gaging stations were maintained by the Survey and the cooperating organizations at about 1,500 points in the United States and many discharge measurements were made at other points. In connection with this work data were also collected in regard to precipitation, evaporation, storage reservoirs, river profiles, and water power in many sections of the country, and will be made available in the regular surface water-supply papers from time to time. A complete list of the gaging stations maintained by the Survey to and including 1910 and a list of the papers relating to the water supply of the country has been published by the Survey as Water-Supply Paper 280. An index to the reports containing stream-flow measurements prior to 1904 has been published as Water-Supply Paper 119.

For each calendar year there has been prepared a report embodying the stream-flow data collected during that year, which has been published either as a part of the Annual Report of the Director, as a bulletin, or as a water-supply paper, as shown by the following table:

Stream-flow data in reports of the United States Geological Survey.

[A=Annual Report; B=Bulletin; WS=Water-Supply Paper.]

Report.	Character of data.	Year.
10th A, pt. 2	Descriptive information only	
11th A, pt. 2	Monthly discharge	1884 to Sept., 1890.
12th A, pt. 2	....do	1884 to June 30, 1891.
13th A, pt. 3	Mean discharge in second-feet	1884 to Dec. 31, 1892.
14th A, pt. 2	Monthly discharge (long-time records, 1871 to 1893)	1888 to Dec. 31, 1893.
B 131	Descriptions, measurements, gage heights, and ratings	1893 and 1894.
16th A, pt. 2	Descriptive information only	
B 140	Descriptions, measurements, gage heights, ratings, and monthly discharge (also many data covering earlier years).	1895.
WS 11	Gage heights (also gage heights for earlier years)	1896.
18th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also similar data for some earlier years).	1895 and 1896.
WS 15	Descriptions, measurements, and gage heights, eastern United States, eastern Mississippi River, and Missouri River above junction with Kansas.	1897.
WS 16	Descriptions, measurements, and gage heights, western Mississippi River below junction of Missouri and Platte, and western United States.	1897.
19th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also some long-time records).	1897.
WS 27	Measurements, ratings, and gage heights, eastern United States, eastern Mississippi River, and Missouri River.	1898.
WS 28	Measurements, ratings, and gage heights, Arkansas River and western United States.	1898.
20th A, pt. 4	Monthly discharge (also for many earlier years)	1898.
WS 35 to 39	Descriptions, measurements, gage heights, and ratings	1899.
21st A, pt. 4	Monthly discharge	1899.
WS 47 to 52	Descriptions, measurements, gage heights, and ratings	1900.
22d A, pt. 4	Monthly discharge	1900.
WS 65, 66	Descriptions, measurements, gage heights, and ratings	1901.
WS 75	Monthly discharge	1901.
WS 82 to 85	Complete data	1902.
WS 97 to 100	.....do	1903.
WS 124 to 135	.....do	1904.
WS 165 to 178	.....do	1905.
WS 201 to 214	Complete data, except descriptions	1906.
WS 241 to 252	Complete data	1907–8.
WS 261 to 272	.....do	1909.
WS 281 to 292	.....do	1910.
WS 301 to 312	.....do	1911.

NOTE.—No data regarding stream flow are given in the 15th and 17th annual reports.

The table which follows gives, by years and drainage basins, the numbers of the papers on surface-water supply published from 1899 to 1911. The data for any particular station will be found in the reports covering the years during which the station was maintained. For example, data for Machias River at Whitneyville, Me., 1903 to 1911, are published in Water-Supply Papers 97, 124, 165, 201, 241, 261, 281, and 301, which contain records for the New England streams from 1903 to 1911.

Numbers of water-supply papers containing results of stream measurements, 1899–1911.

	1899[a]	1900[b]	1901	1902	1903	1904
North Atlantic coast (St. John River to York River)	35	47, c48	65, 75	82	97	d124, e125, f126
South Atlantic coast and eastern Gulf of Mexico (James River to the Mississippi)	g35, 36	48	65, 75	g82, 83	g97, 98	f126, 127
Ohio River basin	36	48, h49	65, 75	83	98	128
St. Lawrence River and Great Lakes	36	49	65, 75	i82, 83	97	129
Hudson Bay and upper Mississippi River	36	49	j65, 66, 75	j83, 85	j98, 99, 100	j128, 130
Missouri River	k36, 37	49, l50	66, 75	84	99	130, m131
Lower Mississippi River	37	50	j65, 66, 75	j83, 84	j98, 99	j128, 131
Western Gulf of Mexico	37	50	66, 75	84	99	132
Colorado River	n37, 38	50	66, 75	85	100	133
Great Basin	38, p39	51	66, 75	85	100	133, q134
Pacific coast in California	38, r39	51	66, 75	85	100	134
North Pacific coast	38	51	66, 75	85	100	135

	1905	1906	1907–8	1909	1910	1911
North Atlantic coast (St. John River to York River)	d165, e166, f167	d201, e202, f203	241	261	281	301
South Atlantic coast and eastern Gulf of Mexico (James River to the Mississippi)	f167, 168	f203, 204	242	262	282	302
Ohio River basin	169	205	243	263	283	303
St. Lawrence River and Great Lakes	170	206	244	264	284	304
Hudson Bay and upper Mississippi River	171	207	245	265	285	305
Missouri River	172	208	246	266	286	306
Lower Mississippi River	j169, 173	j205, 209	247	267	287	307
Western Gulf of Mexico	174	210	248	268	288	308
Colorado River	175, o177	211	249	269	289	309
Great Basin	176, q177	212, q213	250, q251	270, q271	290	310
Pacific coast in California	177	213	251	271	291	311
North Pacific coast	s177, 178	214	252	272	292	312

[a] Rating tables and index to Water-Supply Papers 35–39 contained in Water-Supply Paper 39.
[b] Rating tables and index to Water-Supply Papers 47–52 and data on precipitation, wells, and irrigation in California and Utah contained in Water-Supply Paper 52.
[c] Wissahickon and Schuylkill rivers to James River.
[d] New England rivers only.
[e] Hudson River to Delaware River, inclusive.
[f] Susquehanna River to Yadkin River, inclusive.
[g] James River only.
[h] Scioto River.
[i] Lake Ontario and tributaries to St. Lawrence River proper.
[j] Tributaries of Mississippi from east.
[k] Gallatin River.
[l] Loup and Platte rivers near Columbus, Nebr., and all tributaries below junction with Platte.
[m] Platte and Kansas rivers.
[n] Green and Gunnison rivers and Grand River above junction with Gunnison.
[o] Below junction with Gila.
[p] Mohave River only.
[q] Great Basin in California, excepting Truckee and Carson drainage basins.
[r] Kings and Kern rivers and south Pacific coast drainage basins.
[s] Rogue, Umpqua, and Siletz rivers only.

DEFINITION OF TERMS.

The volume of water flowing in a stream—the "run-off" or "discharge"—is expressed in various terms, each of which has become associated with a certain class of work. These terms may be divided into two groups—(1) those which represent a rate of flow, as second-feet, gallons per minute, miner's inches, and discharge in second-feet per square mile, and (2) those which represent the actual quantity of water, as run-off in depth in inches, and acre-feet. The units used in this series of reports are second-feet, second-feet per square mile,

run-off in depth in inches, and acre-feet. They may be defined as follows:

"Second-foot" is an abbreviation for cubic foot per second and is the unit for the rate of discharge of water flowing in a stream 1 foot wide, 1 foot deep, at a rate of 1 foot a second. It is generally used as a fundamental unit from which others are computed by the use of the factors given in the following table of equivalents.

"Second-feet per square mile" is the average number of cubic feet of water flowing per second from each square mile of area drained, on the assumption that the run-off is distributed uniformly both as regards time and area.

"Run-off in depth in inches" is the depth to which the drainage area would be covered if all the water flowing from it in a given period were conserved and uniformly distributed on the surface. It is used for comparing run-off with rainfall, which is usually expressed in depth in inches.

An "acre-foot" is equivalent to 43,560 cubic feet, and is the quantity required to cover an acre to the depth of 1 foot. The term is commonly used in connection with storage for irrigation work.

CONVENIENT EQUIVALENTS.

The following is a list of convenient equivalents for use in hydraulic computations:

Table for converting discharge in second-feet per square mile into run-off in depth in inches over the area.

Second-feet per square mile.	Run-off in inches.				
	1 day.	28 days.	29 days.	30 days.	31 days.
1	0.03719	1.041	1.079	1.116	1.153
2	.07438	2.083	2.157	2.231	2.306
3	.11157	3.124	3.236	3.347	3.459
4	.14876	4.165	4.314	4.463	4.612
5	.18595	5.207	5.393	5.578	5.764
6	.22314	6.248	6.471	6.694	6.917
7	.26033	7.289	7.550	7.810	8.070
8	.29752	8.331	8.628	8.926	9.223
9	.33471	9.372	9.707	10.041	10.376

NOTE.—For partial month multiply the values for one day by the number of days.

Table for converting discharge in second-feet into run-off in acre-feet.

Second-feet.	Run-off in acre-feet.				
	1 day.	28 days.	29 days.	30 days.	31 days.
1	1.983	55.54	57.52	59.50	61.49
2	3.967	111.1	115.0	119.0	123.0
3	5.950	166.6	172.6	178.5	184.5
4	7.934	222.1	230.1	238.0	246.0
5	9.917	277.7	287.6	297.5	307.4
6	11.90	333.2	345.1	357.0	368.9
7	13.88	388.8	402.6	416.5	430.4
8	15.87	444.3	460.2	476.0	491.9
9	17.85	499.8	517.7	535.5	553.4

NOTE.—For partial month multiply values for one day by the number of days.

1 second-foot equals 40 California miner's inches (law of March 23, 1901).
1 second-foot equals 38.4 Colorado miner's inches.
1 second-foot equals 40 Arizona miner's inches.
1 second-foot equals 7.48 United States gallons per second; equals 448.8 gallons per minute; equals 646,317 gallons for one day.
1 second-foot for one year covers 1 square mile 1.131 feet or 13.572 inches deep.
1 second-foot for one year equals 31,536,000 cubic feet.
1 second-foot equals about 1 acre-inch per hour.
1 second-foot for one day equals 86,400 cubic feet.
1,000,000,000 (1 United States billion) cubic feet equals 11,570 second-feet for 1 day.
1,000,000,000 cubic feet equals 414 second-feet for one 28-day month.
1,000,000,000 cubic feet equals 399 second-feet for one 29-day month.
1,000,000,000 cubic feet equals 386 second-feet for one 30-day month.
1,000,000,000 cubic feet equals 373 second-feet for one 31-day month.
100 California miner's inches equals 18.7 United States gallons per second.
100 California miner's inches for one day equals 4.96 acre-feet.
100 Colorado miner's inches equals 2.60 second-feet.
100 Colorado miner's inches equals 19.5 United States gallons per second.
100 Colorado miner's inches for one day equals 5.17 acre-feet.
100 United States gallons per minute equals 0.223 second-foot.
100 United States gallons per minute for one day equals 0.442 acre-foot.
1,000,000 United States gallons per day equals 1.55 second-feet.
1,000,000 United States gallons equals 3.07 acre-feet.
1,000,000 cubic feet equals 22.95 acre-feet.
1 acre-foot equals 325,850 gallons.
1 inch deep on 1 square mile equals 2,323,200 cubic feet.
1 inch deep on 1 square mile equals 0.0737 second-foot per year.
1 foot equals 0.3048 meter.
1 mile equals 1.60935 kilometers.
1 mile equals 5,280 feet.
1 acre equals 0.4047 hectare.
1 acre equals 43,560 square feet.
1 acre equals 209 feet square, nearly.
1 square mile equals 2.59 square kilometers.
1 cubic foot equals 0.0283 cubic meter.
1 cubic foot of water weighs 62.5 pounds.
1 cubic meter per minute equals 0.5886 second-foot.
1 horsepower equals 550 foot-pounds per second.
1 horsepower equals 76.0 kilogram-meters per second.
1 horsepower equals 746 watts.
1 horsepower equals 1 second-foot falling 8.80 feet.
1⅓ horsepower equals about 1 kilowatt.

To calculate water power quickly: $\frac{\text{Sec.-ft.} \times \text{fall in feet}}{11}$ = net horsepower on water wheel realizing 80 per cent of theoretical power.

EXPLANATION OF DATA.

For each regular current-meter gaging station the following data, so far as available, are given: Description of the station, list of discharge mesaurements, table of daily gage heights, table of daily discharge, table of monthly and yearly discharges and run-off. For stations located at weirs or dams the gage-height table is omitted.

In addition to statements regarding the location and installation of current-meter stations, the descriptions give information in regard to any conditions which may affect the constancy of the relation of gage height to discharge, covering such points as ice, logging, shifting channels, and backwater; also information regarding diversions which decrease the total flow at the measuring section. Statements are also made regarding the accuracy and reliability of the data.

The table of daily gage heights records the daily fluctuations of the surface of the river as found from the mean of the gage readings taken each day, usually in the morning and in the evening. The gage height given in the table represents the elevation of the surface of the water above the zero of the gage. All gage heights affected by the presence of ice in the streams or by backwater from obstructions are published as recorded, with suitable footnotes. The rating table is not applicable for such periods unless the proper corrections to the gage heights are known and applied. Attention is called to the fact that the zero of the gage is placed at an arbitrary datum and has no relation to zero flow or the bottom of the river. In general the zero is located somewhat below the lowest known flow, so that negative readings shall not occur.

The discharge measurements and gage heights are the base data from which rating tables, daily discharge tables, and monthly discharge tables are computed.

The rating table gives, either directly or by interpolation, the discharge in second-feet corresponding to every stage of the river recorded during the period for which it is applicable. It is not published in this report, but can be determined from the tables of daily gage heights and daily discharge as follows:

First plot the discharge measurements for the current and earlier years on cross-section paper, with gage heights in feet as ordinates and discharge in second-feet as abscissas. Then tabulate a number of gage heights taken from the daily gage-height table for the complete range of stage given and the corresponding discharges for the days selected from the daily discharge table and plot the values on cross-section paper. The last points plotted will define the rating curve used and will lie among the plotted discharge measurements. After drawing the rating curve, a table can be developed by scaling off the discharge in second-feet for each tenth foot of gage height. These values should be so adjusted that the first differences shall always be increasing or constant, except for known backwater periods.

The table of daily discharge gives the discharge in second-feet corresponding to the observed gage heights as determined from the rating tables.

In the table of monthly discharge the column headed "Maximum" gives the mean flow, as determined from the rating table, for the day

when the mean gage height was highest. As the gage height is the mean for the day, it does not indicate correctly the stage when the water surface was at crest height, and the corresponding discharge was consequently larger than given in the maximum column. Likewise, in the column of "Minimum" the quantity given is the mean flow for the day when the mean gage height was lowest. The column headed "Mean" is the average flow in cubic feet for each second during the month. On this the computations for the remaining columns, which are defined on page 11, are based.

The field methods used in the collection of the data presented in this series of reports are described in the introductory sections of Water-Supply Papers 261 to 272, inclusive, "Surface water supply of the United States, 1909." Plates I and II show the average precipitation and run-off in the United States as determined from the measurements of stream flow made by the Geological Survey and records of rainfall collected by the Weather Bureau; Plate III shows typical gaging stations; Plate IV shows current meters[1] used in the work.

ACCURACY AND RELIABILITY OF FIELD DATA AND COMPARATIVE RESULTS.

The accuracy of stream-flow data depends primarily on the natural conditions at the gaging station and on the methods and care with which the data are collected. Errors of the first group depend on the degree of permanency of channel and of permanency of the relation between discharge and stage.

Errors of the second class are due, first, to errors in observation of stage; second, to errors in measurements of flow; and, third, to errors due to misinterpretation of stage and flow data.

In order to give engineers and others information regarding the probable accuracy of the computed results, footnotes are added to the daily discharge tables, stating the probable accuracy of the rating tables used, and an accuracy column is inserted in the monthly discharge table. For the rating tables "well defined" indicates, in general, that the rating is probably accurate within 5 per cent; "fairly well defined," within 10 per cent; "poorly defined" or "approximate" within 15 to 25 per cent. These notes are very general and are based on the plotting of the individual measurements with reference to the mean rating curve.

The accuracy column in the monthly discharge table does not apply to the maximum or minimum nor to any individual day, but to the monthly mean. It is based on the accuracy of the rating, the probable reliability of the observer, and knowledge of local condi-

[1] See Hoyt, J. C., and others, Use and care of the current meter as practiced by the United States Geological Survey: Trans. Am. Soc. Civil Eng., vol. 66, 1910, p. 70.

MAP OF UNITED STATES, SHOWING MEAN ANNUAL PRECIPITATION

Blue lines and figures indicate average annual precipitation in depth in inches

Prepared by Henry Gannett
mainly from data of the
United States Geological Survey
and United States Weather Bureau

ENGRAVED AND PRINTED BY THE U. S. GEOLOGICAL SURVEY

MAP OF UNITED STATES, SHOWING MEAN ANNUAL RUN-OFF

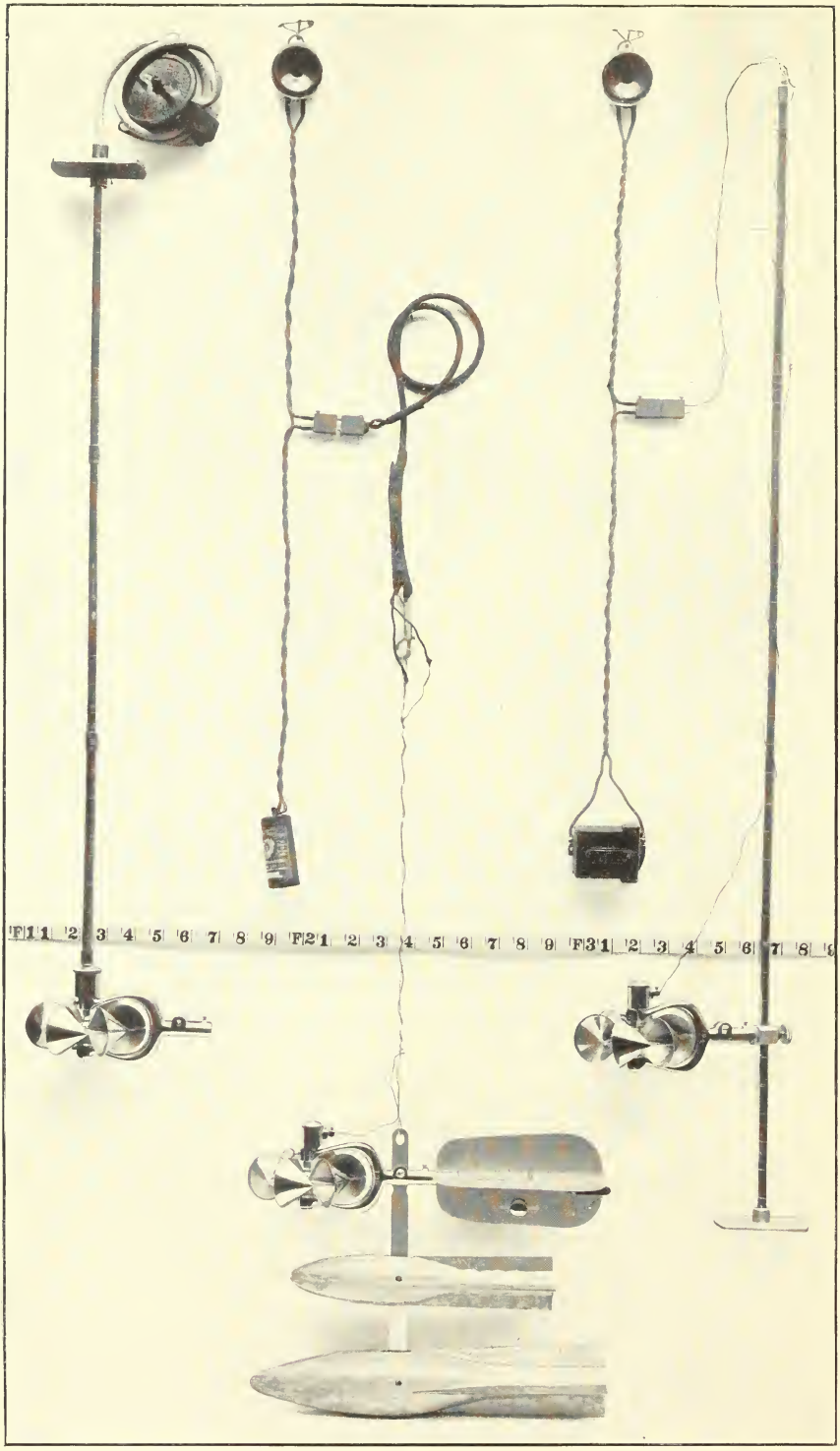
Blue lines and figures indicate average annual run-off in depth in inches

Prepared by Henry Gannett
mainly from data of the
United States Geological Survey

A. FOR BRIDGE MEASUREMENT.

B. FOR WADING MEASUREMENT.

TYPICAL GAGING STATIONS.



SMALL PRICE CURRENT METERS.

tions. In this column A indicates that the mean monthly flow is probably accurate within 5 per cent; B, within 10 per cent; C, within 15 per cent; D, within 25 per cent. Special conditions are covered by footnotes.

Even though the monthly means for any station may represent with a high degree of accuracy the quantity of water flowing past the gage, the figures showing discharge per square mile and depth of run-off in inches may be subject to gross errors which result from including in the measured drainage area large noncontributing districts or omitting estimates of water diverted for irrigation or other use, and they should therefore be considered as only approximate, particularly for periods of irrigation or of low water. For these errors it is as a rule not feasible to make adequate correction.

In general the base data collected each year by the Survey engineers are published not only to comply with the law but to afford any engineer the means of examining and adjusting to his own needs the results of the computations. The table of monthly discharge is so arranged as to give only a general idea of the flow at the station and should not be used for other than preliminary estimates. The determinations of daily discharge allow more detailed studies of the variation in flow by which the period of deficiency may be determined.

It should be borne in mind that the observations in each succeeding year may be expected to throw new light on data already collected and published, and the engineer who makes use of the figures presented in these papers should verify all ratings and make such adjustments for earlier years as may seem necessary.

COOPERATION AND ACKNOWLEDGMENTS.

NEW ENGLAND.

MAINE.

Assistance has been rendered or records furnished in Maine by the following, to whom special acknowledgment is due:

Maine State Water Storage Commission, Frederick W. Plaisted, governor, chairman; M. H. Ranney, chief engineer for International Commission, River St. John; C. M. Tolman, engineer for Bar Harbor & Union River Power Co.; H. B. Moor; H. F. Lord, H. S. Ferguson, and Frank C. Bowler, engineers for Great Northern Paper Co.; Fred Cort; F. E. Boston, manager, and George H. Marr, engineer, for Hollingsworth & Whitney Co.; C. A. Mixer, engineer for Rumford Falls Power Co.; Walter H. Sawyer, agent for Union Water Power Co.; Joseph A. Warren, of S. D. Warren & Co.; J. A. Fleet, general manager for Portland Electric Co.

NEW HAMPSHIRE.

Assistance has been rendered or records furnished in New Hampshire by the following, to whom special acknowledgment is due:

J. Brodie Smith, manager of Manchester Traction, Light & Power Co.; R. A. Hale, principal assistant engineer of Essex Co.; Arthur T. Safford, principal assistant engineer of Locks & Canals Co.; Walter H. Sawyer, agent for Union Water Power Co.; Hollis French; W. H. McElwain Co.; Frederick S. Leonard, of Fisk Paper Co.

VERMONT.

The act providing for the cooperative investigation of the water resources of Vermont is as follows:

It is hereby enacted by the General Assembly of the State of Vermont:

SECTION 1. The Director of the United States Geological Survey being authorized to cooperate with the properly constituted authorities in the several States in making investigation of and reports upon the water resources of the States, the Governor is hereby empowered to enter into contract with the Director of the United States Geological Survey for the purpose of making such investigation and report for this State, provided that the Director shall agree to expend for this purpose sums equal to those hereinafter appropriated and from funds placed at his disposal by the Government of the United States if the appropriations for the general use of the water-resources branch of the department will permit.

SECTION 2. For the purposes set forth in the preceding section the sum of one thousand dollars for the year 1911, and a like sum for the year 1912, is hereby appropriated to be expended by the State, in accordance with the laws relating to and the regulations of the United States Geological Survey in such cases provided, payment to be made on vouchers audited and approved by the Director of said Survey, when presented to the auditor of accounts.

Assistance has been rendered or records furnished in Vermont by the following, to whom special acknowledgment is due: Hon. John A. Mead, governor; Charles Of, general superintendent, and H. M. Summer, engineer, Vermont Copper Co.

MASSACHUSETTS.

Cooperation with the State of Massachusetts began July 1, 1909. The State legislature of 1909 enacted the following:

[Chapter 359.]

An act to provide for an investigation of the water power of the Commonwealth and for determining the best methods of utilizing the same.

Be it enacted, etc., as follows:

SECTION 1. The sum of five thousand dollars may be expended for the determination of the amount of water power available on the streams of the Commonwealth and for investigating the best methods of utilizing the same, thereby providing for the people of the Commonwealth information that may serve to further industrial development.

SECTION 2. The Governor is hereby empowered to enter into a contract with the Director of the United States Geological Survey for the purpose of making the investigation aforesaid: *Provided*, That said Director shall agree to expend a like sum of

money within the Commonwealth for the same purposes: *And provided further*, That if said Director should find that by reason of the failure of the Congress of the United States to provide a general appropriation sufficient to enable him to make an allotment of five thousand dollars for such work in this Commonwealth, the Governor may execute a contract for any part of the amount hereby appropriated, which shall be equal to that allotted by the Director.

SECTION 3. The amount above specified shall be expended by the Commonwealth in accordance with the laws relating to the United States Geological Survey, payment to be made on vouchers audited and approved by said Director when presented to the auditor of the Commonwealth.

The funds provided for stream-gaging work by the Federal Government were insufficient to make it possible to utilize the total amount set forth in the above act, and in May, 1911, the following act was approved:

[Chapter 622.]

An act to provide for the completion of an investigation of the water power of the Commonwealth and for determining the best methods of utilizing the same.

Be it enacted by the senate and house of representatives in general court assembled, and by the authority of the same, as follows:

SECTION 1. The balance of the unexpended appropriation made in the year nineteen hundred and nine for the purposes specified in chapter three hundred and fifty-nine of the acts of the year nineteen hundred and nine may be expended for completing the determination of the amount of water power available on the streams of the Commonwealth and for investigating the best methods of utilizing the same.

SECTION 2. The provisions of said chapter three hundred and fifty-nine shall apply to the completion of said determination and investigation.

The work was again involved by lack of Federal funds to meet the State appropriation. Enough funds were provided, however, to maintain the gage readings at nearly all the stations which had been established and to make a few discharge measurements.

Assistance has been rendered or records furnished in Massachusetts by the following, to whom special acknowledgment is due: Hon. Eugene N. Foss, governor; R. A. Hale, principal assistant engineer of Essex Co.; Arthur T. Safford, principal assistant engineer of Locks & Canals Co.; Dexter Brackett, chief engineer of Metropolitan Water and Sewerage Board; C. W. Hazelton, treasurer of Turners Falls Co.; H. I. Harriman, general manager of Connecticut River Power Co.; A. F. Sickman, hydraulic engineer Holyoke Water Power Co.; Greenfield Electric Light & Power Co.; Otis Co.; George H. Gilbert Manufacturing Co.; E. E. Lochridge, engineer Springfield Water Board; Athol Gas & Electric Co.; F. B. Saunders, engineer; Barrows & Breed, consulting engineers, Boston.

RHODE ISLAND.

Assistance has been rendered or records furnished in Rhode Island by the following, to whom special acknowledgment is due: Natural Resources Survey of Rhode Island, Prof. Charles W. Brown, superintendent; F. J. Pitts, of James Pitts & Sons.

NEW YORK.

The cooperative work in New York State during 1911 was continued as shown in the following funds statement:

Unexpended balance in the different allotments January 1, 1911:		
United States Geological Survey fund	$1,585.24	
State Water Supply Commission fund	5,344.16	
State Engineer fund	590.01	
		$7,519.41
Appropriations during the year:		
United States Geological Survey	$2,500.00	
State Water Supply Commission	10,000.00	
State Engineer's Office	1,500.00	
		14,000.00
Grand total		21,519.41
Balance in the different allotments December 31, 1911:		
United States Geological Survey fund	$1,275.88	
State Water Supply Commission fund	8,027.89	
State Engineer fund	1,046.44	
		10,350.21
		11,169.20
Contributed by outside parties for observers' pay		231.48
Money expended during the year 1911		11,400.68

Two hundred dollars of the Federal fund was reverted to the computing section of the Washington office. The total funds disbursed through the district office were $11,200.68. With these funds 37 stream-gaging and 25 rainfall stations were maintained. One hundred and seventy-nine discharge measurements were made during the year.

Assistance has been rendered or records furnished in New York by the following, to whom special acknowledgment is due: Hon. John A. Bensel, State engineer and surveyor; Alexander E. Kastl, special deputy State engineer, representing New York State cooperation; State Water Supply Commission of New York, Hon. Henry H. Persons, president; State of New York Conservation Commission, Hon. George E. Van Kennan, chairman; New York Additional Water Supply Commission, J. Waldo Smith, chief engineer; United States Weather Bureau; R. P. Bloss, engineer, West Virginia Pulp & Paper Co.; Union Bag & Paper Co.; and International Paper Co.

NEW JERSEY, PENNSYLVANIA, MARYLAND, AND VIRGINIA.

Assistance has been rendered or records furnished in New Jersey, Pennsylvania, Maryland, and Virginia by the following, to whom special acknowledgment is due: United States Weather Bureau; Water Supply Commission of Pennsylvania, John Birkinbine, chairman, Farley Gannett, engineer; Philadelphia Bureau of Water, John E. Codman, in charge of hydrographic work; William C. Whitner, president, Fredericksburg Power Co.

DIVISION OF WORK.

In accordance with a cooperative agreement between the Director of the United States Geological Survey and the governor of Maine, ex officio chairman of the State Water Storage Commission, a new district, known as the Maine district, with headquarters at Augusta, was established December 1, 1909. The work was placed in charge of C. C. Babb, district engineer, who has been aided by F. E. Pressey, assistant engineer.

The field data for New England, outside of Maine, and New York were collected under the direction of C. C. Covert, district engineer, assisted by W. G. Hoyt, C. S. De Golyer, G. H. Canfield, and Francis Weber, junior engineers.

The field data for the Middle Atlantic States were collected under the direction of R. H. Bolster, assistant engineer, assisted by G. C. Stevens and J. G. Mathers, junior engineers.

The ratings, computations, ice estimates, and special studies were made by C. C. Babb, assisted by F. E. Pressey; C. C. Covert, assisted by W. G. Hoyt, C. S. De Golyer, G. H. Canfield, and Francis Weber; and R. H. Bolster, assisted by J. G. Mathers, G. C. Stevens, M. I. Walters, H. D. Padgett, H. J. Dean, A. H. Tuttle, C. L. Batchelder, and W. R. King.

The manuscript for Maine was reviewed by C. C. Babb, and that for New England and New York by C. C. Covert. The complete manuscript was edited by Mrs. B. D. Wood.

ST. JOHN RIVER BASIN.

ST. JOHN RIVER NEAR DICKEY, MAINE.

Location.—Near Dickey post office, Maine, on the farm of L. B. Henderson, 2 miles above the confluence of Allagash and St. John rivers, and three-fourths of a mile below the mouth of Little Black River.

Records available.—July 5, 1910, to November 21, 1911. Data also in annual reports Maine State Water Storage Commission.

Drainage area.—2,820 square miles.

Gage.—Rod, 32½ feet above the measuring section; zero at elevation 584.41 feet above sea level.

Channel.—Permanent; banks not subject to overflow.

Discharge measurements.—Made at low stages by wading and at high stages from a boat.

Winter flow.—Affected by ice.

Artificial control.—A few log-driving dams above station but probably only slightly affecting the discharge.

Accuracy.—Results fairly good.

Cooperation.—Station established by the International Commission, River St. John, which furnishes the daily gage heights and discharge measurements to the Survey.

Discharge measurements of St. John River near Dickey, Maine, in 1911.

[By International Commission, River St. John.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
May 6	593.62	26,600	July 17	585.77	575
12	593.58	23,436	26	586.02	881
21	588.52	4,660	Aug. 2	589.70	8,970
29	588.07	4,048	3	589.21	7,209
June 6	588.32	4,199	8	587.30	2,721
15 [a]	587.31	2,670	Sept. 9	587.51	2,875
27	586.21	1,030	19	586.70	1,693
July 5	586.18	991	Nov. 9	587.51	3,194

[a] Measurement made 50 feet above regular section.

Daily gage height, in feet above sea level, of St. John River near Dickey, Maine, for 1911.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	.....	587.59	586.31	.....	586.65	587.25	.....
2	.....	588.59	586.31	.....	586.35	587.15	.....
3	.....	.....	586.41	589.65	586.25	587.05	586.95
4	.....	.....	586.31	588.45	586.25	586.85	586.85
5	.....	589.89	586.41	588.05	586.35	586.95	586.75
6	593.72	588.39	587.31	587.65	586.45	587.15	586.55
7	593.22	587.45	587.21	587.45	586.75	587.35	586.35
8	594.22	587.25	586.81	587.35	587.35	587.25	587.51
9	.....	586.95	586.41	587.05	587.45	587.05	587.55
10	.....	586.75	586.31	586.95	587.25	586.85	587.95
11	.....	586.55	586.11	586.65	586.85	586.65	587.55
12	593.58	586.55	586.11	586.35	586.75	586.45	587.45
13	593.03	586.75	586.01	586.25	587.15	586.35	587.65
14	592.33	587.25	585.81	585.95	587.15	586.25	587.95
15	591.63	587.95	585.71	586.05	587.25	586.25	588.05
16	.....	588.35	585.61	586.05	587.35	586.25	588.15
17	.....	588.35	586.11	586.15	587.15	586.15	588.15
18	.....	588.25	586.71	587.15	586.85	586.15	587.95
19	.....	588.25	586.91	586.85	586.70	586.25	587.85
20	588.89	587.85	586.31	586.65	586.55	586.45	587.75
21	588.49	586.95	586.01	586.45	586.35	586.45	587.65
22	588.39	586.95	586.31	586.45	586.25	586.35	.....
23	588.09	586.85	586.31	586.35	586.15	586.45	.....
24	587.99	586.65	586.01	586.05	586.05	586.55	.....
25	588.29	586.55	585.91	586.05	586.05	586.95	.....
26	588.49	586.45	585.91	585.95	586.45	587.05	.....
27	588.49	586.25	586.01	585.85	586.95	586.95	.....
28	588.29	586.11	586.11	585.95	587.35	586.85	.....
29	588.09	586.11	586.31	586.35	587.85	586.65	.....
30	587.99	586.21	587.41	586.55	587.45	586.45	.....
31	587.49	.....	.....	586.65	.....	586.45	.....

Daily discharge, in second-feet, of St. John River near Dickey, Maine, for 1911.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	.....	3,170	1,150	5,000	1,610	2,560	1,58
2	.....	5,440	1,150	7,000	1,200	2,380	1,82
3	.....	6,770	1,280	8,620	1,080	2,220	2,06
4	.....	8,100	1,150	5,070	1,080	1,900	1,90
5	.....	9,430	1,280	4,110	1,200	2,060	1,76
6	25,500	4,920	2,660	3,280	1,340	2,380	1,47
7	23,100	2,910	2,490	2,910	1,760	2,730	1,20
8	28,000	2,560	1,840	2,730	2,730	2,560	3,02
9	30,000	2,060	1,280	2,220	2,910	2,220	3,10
10	29,000	1,760	1,150	2,060	2,560	1,900	3,90

Daily discharge, in second-feet, of St. John River near Dickey, Maine, for 1911—Contd.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
11	26,000	1,470	921	1,610	1,900	1,610	3,100
12	24,800	1,470	921	1,200	1,760	1,340	2,910
13	22,200	1,760	820	1,080	2,380	1,200	3,280
14	19,100	2,560	629	760	2,380	1,080	3,900
15	16,000	3,900	548	860	2,560	1,080	4,110
16	12,000	4,820	477	860	2,730	1,080	4,340
17	5,500	4,820	921	965	2,380	965	4,340
18	5,500	4,570	1,700	2,380	1,900	965	3,900
19	6,000	4,570	2,000	1,900	1,680	1,080	3,680
20	6,280	3,680	1,150	1,610	1,470	1,340	3,480
21	5,170	2,060	820	1,340	1,200	1,340	3,280
22	4,920	2,060	1,150	1,340	1,080	1,200	.....
23	4,200	1,900	1,150	1,200	965	1,340	.....
24	3,980	1,610	820	860	860	1,470	.....
25	4,670	1,470	720	860	860	2,060	.....
26	5,170	1,340	720	760	1,340	2,220	.....
27	5,170	1,080	820	665	2,060	2,060	.....
28	4,670	921	921	760	2,730	1,900	.....
29	4,200	921	1,150	1,200	3,680	1,610	.....
30	3,980	1,030	2,840	1,470	2,910	1,340	.....
31	2,980	.....	3,000	1,610	.....	1,340	.....

NOTE.—Daily discharge determined from a rating curve fairly well defined below 9,800 second-feet.

Monthly discharge of St. John River near Dickey, Maine, for 1911.

[Drainage area, 2,820 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
May 6–31	30,000	2,980	12,600	4.47	4.32	A.
June	9,430	921	3,170	1.12	1.25	B.
July	3,000	477	1,280	.454	.52	B.
August	8,620	665	2,200	.780	.90	B.
September	3,680	860	1,880	.667	.74	B.
October	2,730	965	1,690	.599	.69	B.
November 1–21	4,340	1,200	2,960	1.05	.82	B.

ST. JOHN RIVER AT FORT KENT, MAINE.

Location.—At the suspension footbridge in the town of Fort Kent, a short distance above the mouth of Fish River and about 15 miles below the mouth of St. Francis River.

Records available.—October 13, 1905, to December 31, 1911. Data also in annual reports Maine State Water Storage Commission.

Drainage area.—4,880 square miles.

Gage.—Inclined staff, 22 feet long, in two sections, attached to the new concrete pier nearest the New Brunswick shore of the river. The lower part of the gage is placed in a groove in the side of the pier; the upper part is fastened to the downstream end of the same pier. The gage datum has remained unchanged during the maintenance of the station.

Channel.—Permanent; both banks high, rocky, cleared, and not subject to overflow except in extreme freshets.

Discharge measurements.—Made from the footbridge.

Winter flow.—Affected by ice.

Artificial control.—A few dams on the upper headwaters are used for log driving; the operation of these dams only slightly affects the flow past the gage.

Accuracy.—Relation between gage height and discharge is occasionally affected by backwater caused by logs jamming on the bridge piers and, during the winter, by ice; otherwise the conditions for accurate determination of discharge are fair. A fairly good discharge rating curve has been developed.

Discharge measurements of St. John River at Fort Kent, Maine, in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 3[a]	McLean and Kirkpatrick	19.90	90,100
10[b]	do	13.50	44,800
18	A. M. Kirkpatrick	7.25	12,900
26	do	5.81	7,380
June 3	do	7.49	14,400
13	do	4.44	3,550
29	do	3.80	2,180
July 7	do	4.38	3,460
19	do	3.60	1,780
Aug. 11	do	4.10	2,640

[a] Float measurement.
[b] Velocity measured at the surface.
NOTE.—These measurements were made under the direction of International Commission, River St. John.

Daily gage height, in feet, of St. John River at Fort Kent, Maine, for 1911.

[A. V. Currie, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1				4.0	10.95	5.8	3.9	7.4	3.6	4.5	3.6	
2					14.75	6.5	3.9	6.85	3.5	4.2	3.5	7.0
3	4.3				17.55	7.45	3.9	6.4	3.4	4.1	3.5	
4		4.0	4.0		17.65	7.15	4.0	5.7	3.3	4.0	3.4	
5					15.75	6.65	4.0	5.2	3.2	3.9	3.4	
6					13.3	6.1	4.1		3.35	4.05	3.45	
7	4.1				12.9	5.6	4.25	4.5	3.55	4.35	3.65	
8				4.5	12.85	5.25	4.35	4.4	3.9	4.4	4.1	
9					13.25	5.05	4.4	4.55	4.15	4.25	4.65	6.0
10					13.5	4.85	4.35	4.4	4.35	4.05	4.85	
11		3.9	4.0		13.0		4.25	4.05	4.25	4.0	4.75	
12					11.35	4.4	4.05	3.85	4.05	3.9	4.6	
13					10.75	4.4	3.85	3.7	4.0	3.8	4.6	
14	4.4			4.75	10.2	4.45	3.6	3.55	4.15	3.65	4.7	
15				5.2	9.15	4.7	3.2	3.45	4.35		4.7	7.1
16				5.85	8.65	5.5	3.0	3.35	4.4	3.4	4.8	7.2
17				5.8	8.0	5.65	3.0	3.4	4.4	3.4	4.9	7.1
18		4.0	4.0	5.7	7.25	5.8	3.0	3.55	4.15	3.5	4.9	7.1
19				5.65	7.05	5.75	3.1	3.8	4.05	3.5	4.85	7.0
20				5.75	7.0	5.55	3.0	4.05	3.85	3.4	4.8	7.0
21	4.2			5.85		5.25	3.05	3.9	3.65	3.4	4.7	6.9
22				6.0	6.6	4.95	3.3	3.7	3.45	3.4	4.6	6.75
23				6.05	6.15	4.65	3.7	3.7	3.35	3.6	4.6	6.55
24				6.3	6.0	4.45	3.85	3.5	3.3	4.15	4.45	6.25
25		4.0	4.2	6.35	5.95	4.25	3.9	3.25	3.3	4.15	4.4	5.95
26				6.95	5.9	4.15	3.8	3.2	3.4	4.0	4.55	5.55
27				7.7	6.1	4.0	3.7	3.2	4.2	3.95		
28	4.1			8.05		3.95	3.5	3.2	5.1	3.9		
29				8.3	6.5	3.9	3.5	3.25	5.15	3.8		
30				8.65	6.45	3.9	4.25	3.45	4.85	3.8	7.5	
31					6.1		6.55	3.5		3.7		

NOTE.—Relation of gage height to discharge affected by ice from Jan. 1 to Apr. 13, Nov. 27 to Dec. 14, and Dec. 27 to 31. All gage readings during these periods were probably taken to the surface of the water.

Daily discharge, in second-feet, of St. John River at Fort Kent, Maine, for 1911.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	.....	29,600	7,330	2,320	13,300	1,810	3,610	1,810
2	.....	51,300	9,770	2,320	11,100	1,660	2,920	1,660
3	.....	69,300	13,500	2,320	9,400	1,520	2,710	1,660
4	.....	70,000	12,300	2,510	7,010	1,390	2,510	1,520
5	.....	57,500	10,300	2,510	5,470	1,270	2,320	1,520
6	.....	42,500	8,340	2,710	4,540	1,460	2,610	1,590
7	.....	40,200	6,690	3,030	3,610	1,740	3,260	1,890
8	.....	39,900	5,620	3,260	3,370	2,320	3,370	2,710
9	.....	42,200	5,040	3,370	3,740	2,820	3,030	3,980
10	.....	43,700	4,500	3,260	3,370	3,260	2,610	4,500
11	.....	40,800	3,940	3,030	2,610	3,030	2,510	4,240
12	.....	31,700	3,370	2,610	2,230	2,610	2,320	3,860
13	.....	28,600	3,370	2,230	1,970	2,510	2,140	3,860
14	4,240	25,900	3,490	1,810	1,740	2,820	1,890	4,110
15	5,470	20,900	4,110	1,270	1,590	3,260	1,700	4,110
16	7,500	18,600	6,380	1,060	1,460	3,370	1,520	.....
17	7,330	15,800	6,850	1,060	1,520	3,370	1,520	.....
18	7,010	12,700	7,330	1,060	1,740	2,820	1,660	.....
19	6,850	11,900	7,170	1,160	2,140	2,610	1,660	.....
20	7,170	11,700	6,540	1,060	2,610	2,230	1,520	.....
21	7,500	10,900	5,620	1,110	2,320	1,890	1,520	.....
22	8,000	10,100	4,760	1,390	1,970	1,590	1,520	.....
23	8,170	8,520	3,980	1,970	1,970	1,460	1,810	.....
24	9,040	8,000	3,490	2,230	1,660	1,390	2,820	.....
25	9,220	7,830	3,030	2,320	1,330	1,390	2,820	.....
26	11,500	7,660	2,820	2,140	1,270	1,520	2,510	.....
27	14,500	8,340	2,510	1,970	1,270	2,920	2,420	.....
28	16,000	9,060	2,420	1,660	1,270	5,180	2,320	.....
29	17,100	9,770	2,320	1,660	1,330	5,320	2,140	.....
30	18,600	9,580	2,320	3,030	1,590	4,500	2,140	.....
31	.....	8,340	.....	9,960	1,660	.....	1,970	.....

NOTE.—Daily discharge determined from a well-defined rating curve.

Monthly discharge of St. John River at Fort Kent, Maine, for 1911.

[Drainage area, 4,880 square miles.[a]]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	.....	.....	800	0.164	0.19	D.
February	.....	.....	600	.123	.13	D.
March	.....	.....	650	.133	.15	D.
April	18,600	.....	6,050	1.24	1.38	B.
May	70,000	7,660	25,900	5.31	6.12	A.
June	13,500	2,320	5,640	1.16	1.29	A.
July	9,960	1,060	2,370	.486	.56	A.
August	13,300	1,270	3,300	.676	.78	A.
September	5,320	1,270	2,500	.512	.57	A.
October	3,610	1,520	2,300	.471	.54	A.
November	.....	.....	2,330	.477	.53	C.
December	.....	.....	1,650	.338	.39	D.
The year	70,000	.....	4,540	.930	12.63	

[a] Does not include Chamberlain Lake drainage area of 270 square miles.

NOTE.—Discharge for the winter periods determined by means of climatologic records and comparison with the discharge at other points in northern Maine.

Mean discharge Apr. 1 to 13 estimated 2,130 second-feet.

Mean discharge Nov. 16 to 31 estimated 1,800 second-feet.

ST. JOHN RIVER AT VAN BUREN, MAINE.

Location.—At new International Bridge at Van Buren, Maine, about 14 miles above Grand Falls, N. B.

Records available.—May 4, 1908, to December 15, 1911.

Drainage area.—8,270 square miles.

Gage.—Painted vertically on second pier from Van Buren side of bridge; zero of gage is 407.69 feet above sea level; daily gage heights for 1910 and 1911 were read on a vertical rod attached to the pier of the sawdust carrier of Hammonds mill, about 700 feet below the International Bridge.

Discharge measurements.—Made from the International Bridge.

Winter flow.—Affected by ice.

Artificial control.—The little storage above for log driving probably does not affect the discharge.

Accuracy.—Relation between gage heights and discharge is probably not materially affected by the control of the stream for log driving; for the winter months an ice rating curve has been developed. A good open-channel discharge rating curve has also been constructed.

Cooperation.—Station established by the International Commission, River St. John, which furnishes records of discharge measurements and daily gage heights.

Discharge measurements of St. John River at Van Buren, Maine, in 1911.

[By International Commission, River St. John.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Mar. 24[a]	410.69	1,195	June 23	412.54	10,112
31[a]	411.36	1,740	July 1	410.89	6,144
Apr. 11[a]	411.74	2,343	15	409.89	3,611
15[a]	412.94	4,386	Aug. 1	414.91	16,764
17[a]	414.83	7,740	7	411.49	6,473
19[a]	415.34	8,869	Sept. 7	409.40	2,737
22[a]	416.49	11,553	18	410.28	4,630
May 9[b]	426.6	72,000	Nov. 3	409.31	2,719
17[b]	420.1	35,550	4	409.07	1,784
25[b]	415.79	20,034	6	409.04	2,128
June 2[b]	415.84	19,236	6	409.10	2,190
9	413.79	12,797	17	411.93	3,547

[a] Made under complete ice cover and affected by backwater from an ice jam which forms, in the fall of the year, about 1 mile below the bridge.
[b] Float measurement.

Daily gage height, in feet, of St. John River at Van Buren, Maine, for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	10.9	10.5	10.4	11.3	29.3	15.8	10.9	15.4	9.4	10.7	9.6	11.9
2	11.0	10.5	10.4	11.3	33.2	16.6	10.7	15.0	9.5	10.3	9.4	11.8
3	11.1	10.5	10.4	11.3	34.9	17.4	10.7	14.4	9.4	10.1	9.4	11.8
4	11.1	10.5	10.4	11.3	34.9	17.2	10.8	13.4	9.3	10.0	9.2	11.9
5	11.1	10.5	10.4	11.3	30.9	16.5	10.9	12.7	9.4	10.0	9.1	12.2
6	11.1	10.5	10.4	11.3	28.6	15.6	10.7	12.1	9.3	9.9	9.0	12.2
7	11.0	10.5	10.4	11.3	26.6	15.1	11.1	11.5	9.4	9.9	9.3	12.2
8	11.0	10.5	10.4	11.4	26.5	14.4	11.3	11.2	9.7	10.1	9.5	12.2
9	11.0	10.5	10.4	11.5	26.9	13.9	11.0	11.0	9.9	10.3	9.4	12.2
10	11.0	10.5	10.4	11.6	27.3	13.5	10.7	10.9	10.2	10.4	10.0	12.2
11	11.0	10.5	10.4	11.7	26.7	13.1	10.6	10.7	10.4	10.0	10.9	12.2
12	11.0	10.5	10.4	11.8	25.5	12.8	10.4	10.5	10.4	9.8	11.0	12.1
13	11.0	10.5	10.4	11.9	24.0	12.5	10.2	10.2	10.3	9.5	10.8	12.2
14	11.0	10.5	10.4	12.0	23.2	12.5	10.0	9.9	10.2	9.4	10.7	12.2
15	11.0	10.5	10.4	13.0	22.2	13.0	9.8	9.7	10.2	9.3	11.0	12.3

Daily gage height, in feet, of St. John River at Van Buren, Maine, for 1911—Contd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16	10.9	10.5	10.4	14.2	20.9	13.4	9.7	9.6	10.9	9.1	10.8	.....
17	10.9	10.5	10.5	14.9	20.2	14.0	9.9	9.6	11.5	9.4	12.1	.....
18	10.8	10.5	10.5	15.3	19.5	14.1	10.2	9.6	10.2	9.3	12.1	.....
19	10.8	10.5	10.5	15.4	18.1	14.0	10.4	9.7	10.1	9.3	12.7	.....
20	10.7	10.5	10.6	15.6	17.8	13.7	10.5	9.9	10.0	9.3	12.5	.....
21	10.7	10.5	10.6	16.2	17.7	13.1	10.3	10.1	9.8	9.4	12.2	.....
22	10.7	10.5	10.6	16.5	17.6	13.0	10.3	10.0	9.6	9.3	12.3	.....
23	10.7	10.5	10.6	17.7	17.4	12.6	10.5	9.8	9.5	9.3	12.2	.....
24	10.6	10.5	10.7	18.2	16.7	12.2	10.8	9.7	9.3	9.7	12.1	.....
25	10.6	10.5	10.7	18.7	16.2	11.8	10.9	9.4	9.1	10.1	12.1	.....
26	10.6	10.5	10.7	20.1	15.7	11.4	11.0	9.3	9.4	10.0	11.9	.....
27	10.6	10.5	10.7	21.5	15.6	11.2	10.9	9.2	9.5	10.2	11.8	.....
28	10.6	10.5	10.8	20.5	15.7	10.9	10.8	9.1	9.8	10.0	11.8	.....
29	10.5	.....	10.9	23.4	15.9	10.9	10.8	9.4	10.9	9.9	11.7	.....
30	10.5	.....	11.1	26.7	15.6	10.9	10.9	9.4	11.1	9.7	11.9	.....
31	10.5	.....	11.3	.....	15.2	.....	11.7	9.4	.....	9.7	.....	.....

NOTE.—Gage heights referred to gage of International Bridge. To reduce readings to elevation above sea level add 400 feet. Readings affected by backwater from ice Jan. 1 to Apr. 25 and Nov. 17 to Dec. 15.

Daily discharge, in second-feet, of St. John River at Van Buren, Maine, for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,400	1,010	920	1,830	90,700	19,600	6,020	18,200	2,750	5,560	3,160	2,550
2	1,500	1,010	920	1,830	121,000	22,300	5,560	17,000	2,950	4,660	2,750	2,420
3	1,610	1,010	920	1,830	134,000	25,200	5,560	15,200	2,750	4,220	2,750	2,420
4	1,610	1,010	920	1,830	134,000	24,500	5,790	12,400	2,560	4,010	2,360	2,550
5	1,610	1,010	920	1,830	103,000	22,000	6,020	10,500	2,750	4,010	2,180	2,940
6	1,610	1,010	920	1,830	85,700	18,900	5,560	8,980	2,560	3,800	2,000	2,940
7	1,500	1,010	920	1,830	72,200	17,300	6,500	7,480	2,750	3,800	2,560	2,940
8	1,500	1,010	920	1,940	71,600	15,200	6,980	6,740	3,370	4,220	2,950	2,940
9	1,500	1,010	920	2,060	74,200	13,800	6,260	6,260	3,800	4,660	2,750	2,940
10	1,500	1,010	920	2,180	76,800	12,600	5,560	6,020	4,440	4,880	4,010	2,940
11	1,500	1,010	920	2,300	72,800	11,600	5,330	5,560	4,880	4,010	6,020	2,940
12	1,500	1,010	920	2,420	65,300	10,800	4,880	5,100	4,880	3,580	6,260	2,810
13	1,500	1,010	920	2,550	56,500	10,000	4,440	4,440	4,660	2,950	5,790	2,940
14	1,500	1,010	920	2,680	52,000	10,000	4,010	3,800	4,440	2,750	5,560	2,940
15	1,500	1,010	920	4,100	46,700	11,300	3,580	3,370	4,440	2,560	6,260	3,080
16	1,400	1,010	920	6,350	40,300	12,400	3,370	3,160	6,020	2,180	5,790	.....
17	1,400	1,010	1,010	7,900	36,900	14,000	3,800	3,160	7,480	2,750	4,000	.....
18	1,300	1,010	1,010	8,800	33,800	14,300	4,440	3,160	4,440	2,560	4,000	.....
19	1,300	1,010	1,010	9,030	27,900	14,000	4,880	3,370	4,220	2,560	3,650	.....
20	1,200	1,010	1,100	9,490	26,800	13,200	5,100	3,800	4,010	2,560	3,360	.....
21	1,200	1,010	1,100	10,900	26,400	11,600	4,660	4,220	3,580	2,750	2,940	.....
22	1,200	1,010	1,100	11,600	26,000	11,300	4,660	4,010	3,160	2,560	3,080	.....
23	1,200	1,010	1,100	14,400	25,200	10,300	5,100	3,580	2,950	2,560	2,940	.....
24	1,100	1,010	1,200	15,600	22,700	9,230	5,790	3,370	2,560	3,370	2,810	.....
25	1,100	1,010	1,200	16,800	20,900	8,220	6,020	2,750	2,180	4,220	2,810	.....
26	1,100	1,010	1,200	36,500	19,200	7,230	6,260	2,560	2,750	4,010	2,550	.....
27	1,100	1,010	1,200	43,200	18,900	6,740	6,020	2,360	2,950	4,440	2,420	.....
28	1,100	1,010	1,300	38,300	19,200	6,020	5,790	2,180	3,580	4,010	2,420	.....
29	1,010	.....	1,400	53,200	19,900	6,020	5,790	2,750	6,020	3,800	2,300	.....
30	1,010	.....	1,610	72,800	18,900	6,020	6,020	2,750	6,500	3,370	2,550	.....
31	1,010	.....	1,830	.....	17,600	.....	7,970	2,750	.....	3,370	.....	.....

NOTE.—Daily discharge Apr. 26 to Nov. 16 determined from a discharge rating curve well defined below 75,000 second-feet.

Discharge Jan. 1 to Apr. 25 and Nov. 19 to Dec. 15 determined from a well-defined ice rating curve.

Discharge Nov. 17 and 18 estimated.

Monthly discharge of St. John River at Van Buren, Maine, for 1911.

[Drainage area, 8,270 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	1,610	1,010	1,340	0.162	0.19	B
February	1,010	1,010	1,010	.122	.13	B
March	1,830	920	1,070	.129	.15	B
April	72,800	1,830	12,900	1.56	1.74	A
May	134,000	17,600	53,500	6.47	7.46	A
Jun	25,200	6,020	13,200	1.60	1.78	A
July	7,970	3,370	5,410	.654	.75	A
August	18,200	2,180	5,840	.706	.81	A
September	7,480	2,180	3,880	.469	.52	A
October	5,560	2,180	3,570	.432	.50	A
November	6,260	2,300	3,500	.423	.47	A
December	.....	.....	2,700	.326	.38	B
The year	134,000	920	9,060	1.10	14.88	

NOTE.—Mean discharge Dec. 16-31 estimated 2,650 second-feet.

ALLAGASH RIVER NEAR ALLAGASH, MAINE.

Location.—105 feet below the ferry crossing Allagash River, 2 miles below Dickey post office, and 1,500 feet above the confluence of Allagash and St. John rivers.

Records available.—July 1, 1910, to November 30, 1911, when station was discontinued. Data also in annual reports Maine State Water Storage Commission.

Drainage area.—1,240 square miles. Does not include Chamberlain Lake drainage area of 270 square miles.

Gage.—Rod, 35 feet below the measuring section; elevation of zero being 580.53 feet above sea level.

Channel.—Permanent; banks not subject to overflow.

Discharge measurements.—Made at low stages by wading and at high stages from a boat.

Winter flow.—Affected by ice.

Artificial control.—Log driving dams at Long, Ross, and Musquacook lakes may at times hold water back so that the gage heights may indicate lower flow than the natural minimum flow of the stream.

Accuracy.—Results believed to be fairly good.

Cooperation.—Station established by the International Commission, River St. John, which furnishes records of discharge measurements and daily gage heights.

Discharge measurements of Allagash River near Allagash, Maine, in 1911.

[By International Commission, River St. John.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
May 5	586.8	8,100	July 5	582.00	441
May 11	585.87	6,459	July 17	581.60	231
May 20[a]	584.02	3,746	July 26	582.14	595
May 29[a]	584.37	4,213	Aug. 2[b]	583.24	1,408
June 6	583.51	2,244	Aug. 8	581.83	349
June 15	583.05	1,512	Nov. 8	582.02	502
June 27	582.07	594			

[a] Heavy wind blowing downstream giving accelerated velocity.

[b] St. John River at mouth of Allagash was 2.5 feet higher than it should be under normal conditions, thus backing up the Allagash. The rise was due to very heavy rains on the headwaters of the St. John.

Daily gage height, in feet, of Allagash River near Allagash, Maine, for 1911.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	.....	584.07	581.94	581.34	581.54	582.14	581.84
2	.....	584.87	581.94	582.04	581.54	582.14	581.74
3	.....	584.77	581.94	582.64	581.54	582.04	581.74
4	586.57	584.57	582.04	582.34	581.54	582.04	582.04
5	586.47	584.27	581.94	582.14	581.54	581.94	582.04
6	586.07	583.47	581.94	582.04	581.74	581.94	581.94
7	585.87	583.87	581.84	581.94	581.94	581.94	581.94
8	586.07	583.47	581.74	581.84	582.24	581.84	582.04
9	586.27	583.17	581.74	581.84	582.14	581.84	582.04
10	586.07	582.87	581.74	581.74	582.14	581.84	582.14
11	585.87	582.77	581.64	581.74	581.94	581.84	582.14
12	585.77	582.57	581.64	581.64	582.14	581.94	582.04
13	585.37	582.87	581.54	581.64	582.24	581.94	581.84
14	584.87	583.07	581.54	581.54	582.14	581.94	581.94
15	584.67	583.37	581.54	581.64	582.04	581.94	582.04
16	584.37	583.07	581.54	581.64	582.04	581.84	582.04
17	583.87	582.87	581.54	581.64	582.04	581.84	582.04
18	583.87	582.77	581.44	581.64	581.94	581.84	582.14
19	583.97	582.77	581.44	581.64	581.94	581.84	582.24
20	584.07	582.67	581.54	581.54	581.94	581.84	582.24
21	584.07	582.57	581.54	581.54	581.84	581.84	582.24
22	583.87	582.47	581.74	581.54	581.84	581.84	582.24
23	583.77	582.47	581.94	581.64	581.74	581.94	582.24
24	583.67	582.37	581.94	581.64	581.74	581.94	582.24
25	583.27	582.27	581.84	581.64	581.74	581.94	582.24
26	583.47	582.17	581.84	581.64	581.74	581.84	582.24
27	583.77	582.14	581.84	581.64	582.04	581.84	582.24
28	583.97	582.14	581.74	581.54	582.34	581.84	582.24
29	583.77	582.04	581.64	581.54	582.24	581.84	582.24
30	583.97	581.94	582.84	581.54	582.14	581.84	582.24
31	583.37	.....	583.54	581.54	.....	581.84	.....

NOTE.—Gage heights July 3, 5 to 15, and 17 to 20 estimated from record at Michaud farm, about 15 miles above the station. Gage readings Aug. 2 to 6 may have been somewhat affected by backwater from St. John River.

Daily discharge, in second-feet, of Allagash River near Allagash, Maine, for 1911.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	.....	3,180	448	147	218	599	381
2	.....	4,580	448	520	218	599	319
3	.....	4,400	448	1,090	218	520	319
4	7,780	4,040	520	778	218	520	520
5	7,590	3,520	448	599	218	448	520
6	6,810	2,210	448	580	319	448	448
7	6,430	2,850	381	448	448	448	448
8	6,810	2,210	319	381	686	381	520
9	7,200	1,760	319	381	599	381	520
10	6,810	1,360	319	319	599	381	599
11	6,430	1,240	265	319	448	381	599
12	6,240	1,010	265	265	599	448	520
13	5,490	1,360	218	265	686	448	381
14	4,580	1,620	218	218	599	448	448
15	4,220	2,060	218	265	520	448	520
16	3,690	1,620	218	265	520	381	520
17	2,850	1,360	218	265	520	381	520
18	2,850	1,240	179	265	448	381	599
19	3,010	1,240	179	265	448	381	686
20	3,180	1,120	218	218	448	381	686
21	3,180	1,010	218	218	381	381	686
22	2,850	905	319	218	381	381	686
23	2,680	905	448	265	319	448	686
24	2,520	806	448	265	319	448	686
25	1,910	713	381	265	319	448	686
26	2,210	624	381	265	319	381	686
27	2,680	599	381	265	520	381	686
28	3,010	599	319	218	778	381	686
29	2,680	520	265	218	686	381	686
30	3,010	448	1,320	218	599	381	686
31	2,060	.....	2,320	218	.....	381	.....

NOTE.—Daily discharge determined from a fairly well defined discharge rating curve. Discharge Aug. 2 to about Aug. 6 may be somewhat erroneous, as the relation between gage heights and discharge may have been affected by backwater from the St. John.

Monthly discharge of Allagash River near Allagash, Maine, for 1911.

[Drainage area, 1,240 square miles.[a]]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
May 4–31	7,780	1,910	4,310	3.48	3.62	B.
June	4,580	448	1,700	1.37	1.53	A.
July	2,320	179	422	.340	.39	A.
August	1,090	147	336	.271	.31	B.
September	778	218	453	.365	.41	A.
October	599	381	426	.344	.40	A.
November	686	319	564	.455	.51	A.

[a] Does not include Chamberlain Lake drainage of 270 square miles.

ST. FRANCIS RIVER NEAR ST. FRANCIS, MAINE.

Location.—One and one-half miles from St. Francis post office, Maine, 4 miles from Connors, N. B., 1 mile above the mouth of the river, and 3 miles below Glazier Lake.

Records available.—May 11 to November 30, 1910, at the gage at the outlet of Glazier Lake; May 4 to November 30, 1911, at the regular gage near the mouth of the river. Data also in annual reports of Maine State Water Storage Commission.

Drainage area.—560 square miles.

Gage.—Rod, 10 feet below the measuring section; elevation of zero of gage, 528.84 feet above sea level. During 1910 gage heights were read on the rod gage at Glazier Lake, as it was impossible to obtain an observer for the regular gage near the mouth; during 1911 the daily readings were taken at the regular or lower gage.

Channel.—Permanent; banks high and wooded and not liable to overflow.

Discharge measurements.—Made by wading or from a canoe 10 feet above the gage.

Winter flow.—Affected by ice.

Artificial control.—Extensive lake areas above the station but not controlled by dams.

Accuracy.—A fairly good rating curve has been developed for this station and the discharge estimates for 1911 are considered fair. Gage-height record during 1910 on the gage at the outlet of Glazier Lake records the rise and fall of the lake, and the estimates of discharge are not considered as accurate.

Cooperation.—Station established by the International Commission, River St. John, which furnishes records of the discharge measurements and daily gage heights.

Discharge measurements of St. Francis River near St. Francis, Maine, in 1911.

[By International Commission, River St. John.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
May 4	538.3	9,200	June 28	530.19	467
13	535.07	4,760	July 18	529.89	314
19	532.77	2,212	27	530.03	374
27	531.41	1,090	Aug. 9	530.51	593
June 5	531.33	1,036	Sept. 11	529.74	275
14	530.53	578	Nov. 10	529.43	160

NOTE.—Discharge measurements are referred to the regular or lower gage.

Daily gage height, in feet, of St. Francis River near St. Francis, Maine, for 1911.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	.....	.....	529.33	.....	529.63	.....	529.33
2	.....	531.13	.....	530.93	.....	529.53	529.33
3	.....	.....	530.33	.....	529.53	.....	.....
4	538.3	531.33	.....	530.73	.....	529.43	.....
5	.....	531.3	.....	.....	529.53	529.48	529.33
6	539.1	531.03	530.03	530.43	.....	.....	.....
7	.....	.....	.....	530.43	529.53	529.43	529.33
8	.....	530.83	530.13	.....	.....	.....	.....
9	.....	.....	.....	530.53	529.43	529.43	529.33
10	.....	530.33	530.13	.....	.....	529.33	.....
11	.....	.....	.....	530.43	529.73	529.33	529.43
12	.....	.....	530.03	.....	.....	.....	.....
13	535.1	.....	.....	530.13	529.53	529.38	529.33
14	.....	530.53	529.83	.....	.....	.....	.....
15	.....	.....	.....	530.13	529.63	529.38	529.33
16	.....	530.63	529.83	.....	.....	.....	.....
17	535.9	.....	.....	530.13	529.73	529.33	529.43
18	.....	530.63	529.73	.....	529.63	529.33	.....
19	532.8	.....	.....	529.93	.....	529.33	529.43
20	.....	.....	529.63	.....	529.65	.....	.....
21	.....	530.73	.....	529.83	.....	529.33	529.43
22	534.6	.....	529.93	.....	529.53	.....	.....
23	.....	530.53	.....	529.73	.....	529.33	529.63
24	534.1	.....	530.23	.....	529.53	.....	.....
25	.....	530.43	530.23	529.73	.....	529.33	529.63
26	.....	.....	.....	529.63	529.58	.....	.....
27	531.4	530.33	530.03	.....	.....	529.33	529.63
28	.....	530.19	.....	529.53	529.58	.....	.....
29	.....	530.13	530.03	.....	.....	529.33	529.53
30	.....	.....	.....	529.73	529.63	.....	.....
31	530.93	.....	529.33	.....	.....	.....	.....

NOTE.—Gage heights read on the regular or lower gage.

Daily discharge, in second-feet, of St. Francis River near St. Francis, Maine, for 1911.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	.....	852	142	469	230	214	142
2	.....	908	323	796	214	199	142
3	.....	969	504	746	199	184	142
4	9,220	1,030	461	695	199	169	142
5	9,810	1,020	419	622	199	184	142
6	10,400	852	377	548	199	176	142
7	10,000	798	397	548	199	169	142
8	11,000	745	417	566	184	169	142
9	12,000	624	417	595	169	169	142
10	11,000	504	417	566	218	142	156
11	8,000	527	397	548	266	142	169
12	6,000	550	377	482	232	148	156
13	4,780	573	338	417	199	155	142
14	5,040	595	300	417	214	155	142
15	5,300	620	300	417	230	155	142
16	5,560	645	300	417	248	148	156
17	5,820	645	283	417	266	142	169
18	4,040	645	266	377	230	142	169
19	2,260	662	248	337	234	142	169
20	2,900	678	230	318	238	142	169
21	3,540	695	284	300	218	142	169
22	4,180	645	337	283	199	142	200
23	3,900	595	398	266	199	142	230
24	3,610	572	458	266	199	142	230
25	2,970	548	458	266	206	142	230
26	1,920	526	418	230	214	142	230
27	1,080	504	377	214	214	142	230
28	1,010	441	377	199	214	142	214
29	938	417	377	232	222	142	199
30	867	280	260	266	230	142	200
31	796	.....	142	248	.....	142	.....

NOTE.—Daily discharge determined from a well-defined discharge rating curve. Discharge interpolated for days on which gage was not read.

Monthly discharge of St. Francis River near St. Francis, Maine, for 1911.

[Drainage area, 560 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
May 4–31	12,000	796	5,280	9.43	9.82	B.
June	1,030	280	656	1.17	1.30	B.
July	504	142	348	.621	.72	B.
August	796	199	422	.754	.87	B.
September	266	169	216	.386	.43	B.
October	214	142	155	.277	.32	B.
November	230	142	172	.307	.34	B.

MADAWASKA RIVER AT ST. ROSE DU DEGELE, QUEBEC.

Location.—At the highway bridge crossing Madawaska River one-fifth mile from the Temiscouata railroad station; 2 miles below the mouth of Lake Temiscouata, and 21 miles above Edmundston, Canada, and the mouth of the river.

Records available.—May 12, 1910, to November 30, 1911. Data also in annual reports Maine State Water Storage Commission.

Drainage area.—958 square miles.

Gage.—Rod, nailed to west abutment of highway bridge. Zero of gage is at 475.70 feet above sea level.

Channel.—Permanent; banks high and not liable to overflow.

Discharge measurements.—Made from the highway bridge. Some of the earlier measurements were taken at the St. Jacques Bridge, 6 miles above the mouth of the river, and referred to the St. Rose gage, as the Edmundston dam affects the St. Jacques gage at certain stages.

Winter flow.—Probably affected by ice but discharge not estimated for the period.

Accuracy.—Results considered to be fairly good considering the length of record of the station.

Cooperation.—Station established by the International Commission, River St. John, which furnishes records of discharge measurements and gage heights.

Discharge measurements of Madawaska River at St. Rose du Degele, Quebec, in 1911.

[By International Commission, River St. John.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
May 4	481.30	5,712	July 8	477.45	1,393
10	483.16	7,954	20	477.09	1,023
18	482.62	7,308	Aug. 12	476.77	690
26	480.79	4,986	25	476.22	409
June 3	479.73	3,695	Sept. 8[a]	476.34	364
13	478.55	2,464	Nov. 7	476.01	197
30	477.63	1,467			

[a] Measurement uncertain on account of logs in river.

Daily gage height, in feet, of Madawaska River at St. Rose du Degele, Quebec, for 1911.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	.....	79.71	77.51	77.01	76.21	76.41	76.21
2	.....	79.81	77.51	77.01	76.21	76.41	76.21
3	81.01	79.71	77.51	77.01	76.21	76.31	76.11
4	81.21	79.61	77.51	77.01	76.21	76.31	76.11
5	82.01	79.51	77.51	76.91	76.21	76.41	76.11
6	82.21	79.41	77.51	76.91	76.21	76.41	76.11
7	82.61	79.31	77.51	76.91	76.31	76.41	76.11
8	82.81	79.11	77.41	76.91	76.31	76.41	76.11
9	83.01	79.01	77.41	76.91	76.31	76.31	76.11
10	83.21	78.91	77.31	76.81	76.41	76.31	76.11
11	83.21	78.71	77.31	76.71	76.41	76.31	76.11
12	83.31	78.61	77.31	76.71	76.41	76.31	76.11
13	83.31	78.51	77.21	76.71	76.41	76.31	76.11
14	83.21	78.51	77.21	76.71	76.41	76.31	76.11
15	83.11	78.51	77.11	76.71	76.41	76.31	76.21
16	83.01	78.51	77.11	76.71	76.41	76.21	76.21
17	82.71	78.41	77.11	76.71	76.41	76.21	76.31
18	82.51	78.31	77.01	76.61	76.41	76.21	76.31
19	82.21	78.31	77.11	76.61	76.31	76.21	76.21
20	82.01	78.21	77.11	76.51	76.41	76.21	76.21
21	81.91	78.21	77.11	76.41	76.41	76.21	76.21
22	81.61	78.11	77.11	76.31	76.41	76.21	76.21
23	81.21	78.01	77.11	76.31	76.31	76.21	76.21
24	81.11	77.81	77.11	76.21	76.31	76.21	76.21
25	80.91	77.71	77.11	76.21	76.41	76.21	76.26
26	80.71	77.61	77.11	76.21	76.41	76.21	76.21
27	80.51	77.61	77.01	76.21	76.41	76.21	76.21
28	80.31	77.61	77.01	76.11	76.41	76.11	76.21
29	80.21	77.61	77.01	76.11	76.41	76.11	76.31
30	79.91	77.61	77.01	76.11	76.41	76.11	76.21
31	79.71	.....	77.01	76.11	.....	76.11	.....

NOTE.—To reduce gage heights to sea level, add 400 feet.

Daily discharge, in second-feet, of Madawaska River at St. Rose du Degele, Quebec, for 1911.

	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	.....	3,680	1,340	898	341	462	341
2	.....	3,800	1,340	898	341	462	341
3	5,260	3,680	1,340	898	341	401	286
4	5,510	3,560	1,340	898	341	401	286
5	6,510	3,440	1,340	818	341	462	286
6	6,760	3,330	1,340	818	341	462	286
7	7,270	3,210	1,340	818	401	462	286
8	7,530	2,980	1,240	818	401	462	286
9	7,790	2,870	1,240	818	401	401	286
10	8,050	2,760	1,150	738	462	401	286
11	8,050	2,540	1,150	662	462	401	286
12	8,180	2,440	1,150	662	462	401	286
13	8,180	2,330	1,060	662	462	401	286
14	8,050	2,330	1,060	662	462	401	286
15	7,920	2,330	978	662	462	401	341
16	7,790	2,330	978	662	462	341	341
17	7,400	2,230	978	662	462	341	401
18	7,140	2,120	898	592	462	341	401
19	6,760	2,120	978	592	401	341	341
20	6,510	2,020	978	526	462	341	341
21	6,390	2,020	978	462	462	341	341
22	6,010	1,920	978	401	462	341	341
23	5,510	1,820	978	401	401	341	341
24	5,390	1,620	978	341	401	341	341
25	5,140	1,530	978	341	462	341	371
26	4,890	1,430	978	341	462	341	341
27	4,640	1,430	898	341	462	341	341
28	4,400	1,430	898	286	462	286	341
29	4,280	1,430	898	286	462	286	401
30	3,920	1,430	898	286	462	286	341
31	3,680	.....	898	286	.....	286	.....

NOTE.—Daily discharge determined from a discharge rating curve well-defined above 1,300 second-feet.

Monthly discharge of Madawaska River at St. Rose du Degele, Quebec, for 1911.

[Drainage area, 958 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
May 3-31	8,180	2,680	6,380	6.66	7.18	A.
June	3,800	1,430	2,410	2.52	2.81	A.
July	1,340	898	1,080	1.13	1.30	B.
August	898	286	598	.624	.72	B.
September	462	341	426	.445	.50	B.
October	462	286	375	.391	.45	B.
November	401	286	326	.340	.38	B.

FISH RIVER AT WALLAGRASS, MAINE.

Location.—Just below the outlet of Wallagrass Stream, near Soldier Pond post office, about 7 miles south of Fort Kent, and 4 miles below Eagle Lake.

Records available.—July 29, 1903, to December 26, 1908, and May 7, 1911, to November 30, 1911. Data also in annual reports Maine State Water Storage Commission.

Drainage area.—860 square miles.

Gage.—Standard chain attached to trees on the bank; datum unchanged.

Discharge measurements.—Made from car and cable 1,500 feet below the chain gage.

Winter flow.—Affected by ice.

Artificial control.—There is a large lake area above the station, but the flow therefrom is not yet artificially controlled.

Accuracy.—A good rating curve has been developed for this station, and the results are considered good.

Cooperation.—Station maintained during 1911 by the International Commission, River St. John, which furnished the records of discharge measurements and gage heights.

Discharge measurements of Fish River at Wallagrass, Maine, in 1911.

[By International Commission, River St. John.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
May 16	9.54	4,280	June 17	5.08	1,086
May 22	7.25	2,402	July 4	3.91	572
May 31	6.20	1,463	Aug. 10	3.64	407
June 7	5.82	1,354			

Daily gage height, in feet, of Fish River at Wallagrass, Maine, for 1911.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	.....	6.45	3.84	3.94	2.84	.....	2.14
2	.....	6.55	.....	3.94	2.74	2.94	2.14
3	.....	6.55	3.64	3.84	.....	2.94	2.14
4	.....	.....	3.91	3.84	2.94	2.94	2.14
5	.....	6.15	3.74	3.94	2.94	2.74	.....
6	.....	6.05	3.64	.....	2.94	2.74	2.14
7	12.05	5.85	3.54	4.24	2.94	2.64	2.14
8	11.95	5.55	3.54	4.14	2.94	.....	2.24
9	11.95	5.55	.....	4.14	2.94	2.64	2.24
10	11.75	5.45	3.44	3.84	.....	2.54	2.34
11	11.45	.....	3.44	3.44	2.84	2.54	2.34
12	10.85	4.76	3.44	3.14	3.14	2.54	.....
13	10.45	4.65	3.34	.....	3.14	2.54	2.44
14	.....	4.85	3.34	3.04	3.04	2.44	2.44
15	9.65	4.85	3.24	3.04	2.94	.....	2.54
16	9.54	4.75	.....	3.04	3.04	2.44	2.54
17	8.45	5.08	3.14	3.04	.....	2.34	2.64
18	8.15	.....	3.14	3.04	2.94	2.34	2.64
19	7.85	5.24	3.14	3.04	2.94	2.34	.....
20	7.65	5.14	3.14	.....	2.94	2.34	2.74
21	.....	5.24	3.14	3.04	2.94	2.34	2.74
22	7.25	4.84	3.14	3.04	2.94	.....	2.64
23	7.05	4.44	.....	3.14	2.94	2.44	2.54
24	6.55	4.24	3.24	3.14	.....	2.54	2.54
25	6.35	.....	3.34	3.24	2.94	2.44	2.54
26	6.15	3.94	3.34	3.34	3.04	2.34	.....
27	6.05	3.84	3.24	.....	3.14	2.34	2.44
28	.....	3.74	3.14	3.44	3.14	2.34	2.54
29	5.85	3.74	3.44	3.24	3.14	.....	2.64
30	5.45	3.84	.....	3.14	3.14	2.24	2.64
31	6.20	.....	3.44	3.04	.....	2.24	.....

Daily discharge, in second-feet, of Fish River at Wallagrass, Maine, for 1911.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	.....	1,850	582	619	263	319	109
2	.....	1,920	546	619	237	290	109
3	.....	1,920	510	582	263	290	109
4	.....	1,800	608	582	290	290	109
5	.....	1,680	545	619	290	237	109
6	.....	1,620	510	678	290	237	109
7	6,600	1,510	476	737	290	213	109
8	6,500	1,350	476	697	290	213	128
9	6,500	1,350	459	697	290	213	128
10	6,280	1,290	442	582	276	189	147
11	5,940	1,120	442	442	263	189	147
12	5,340	959	442	348	348	189	157
13	4,940	910	410	335	348	189	167
14	4,580	1,000	410	319	319	167	167
15	4,210	1,000	378	319	290	167	189
16	4,110	954	363	319	319	167	189
17	3,210	1,110	348	319	304	147	213
18	2,990	1,150	348	319	290	147	213
19	2,770	1,190	348	319	290	147	225
20	2,630	1,140	348	319	290	147	237
21	2,500	1,190	348	319	290	147	237
22	2,360	995	348	319	290	157	213
23	2,230	820	363	348	290	167	189
24	1,920	737	378	348	290	189	189
25	1,790	678	410	378	290	167	189
26	1,680	619	410	410	319	147	178
27	1,620	582	378	426	348	147	167
28	1,560	545	348	442	348	147	189
29	1,510	545	442	378	348	138	213
30	1,290	582	442	348	348	128	213
31	1,700	.....	442	319	.....	128	.....

NOTE.—Daily discharge determined from a fairly well defined discharge rating curve. Discharge interpolated for days on which gage was not read.

Monthly discharge of Fish River at Wallagrass, Maine, for 1911.

[Drainage area, 860 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
May 7–31	6,600	1,290	3,470	4.03	3.74	B.
June	1,920	545	1,140	1.33	1.48	B.
July	608	348	429	.499	.58	B.
August	737	319	445	.517	.60	B.
September	348	237	300	.349	.39	B.
October	319	128	187	.217	.25	B.
November	237	109	168	.195	.22	B.

ST. CROIX RIVER BASIN.

ST. CROIX NEAR WOODLAND, MAINE.

Location.—One and one-half miles below the dam of the St. Croix Paper Company, 10 miles below the junction of the West Branch with the East Branch and 5 miles above Baring, Maine.

Records available.—December 4, 1902, to December 31, 1911. Station discontinued. Data also in annual reports of the Maine State Water Storage Commission.

Drainage area.—1,420 square miles.

Gages.—Vertical staff, 5½ feet long, attached to a large bowlder on the left bank; a standard chain gage is used during high water. Prior to June 8, 1905, the gage was located at Sprague Falls about 1½ miles above the present site, to which it was removed because of the construction of the dam and mills of the St. Croix Paper Company at the upper site. The relation between the datum of the gage at the original site and that now in use has not been determined.

Channel.—Originally of gravel and rock; now gradually filling up with sawdust pulp from the mill above.

Discharge measurements.—Made from a cable 400 feet below the gage.

Winter flow.—The operation of the mill above and the velocity of the current at the section tend to prevent the river from freezing over at the gage. In 1911 the channel at the gage was open throughout the winter.

Artificial control.—The lake system of the St. Croix above the station comprises in the aggregate 82 square miles. The system is to a large extent controlled by dams which are used both for log driving and for storage. The mill above the station is run continuously, Sundays and week days, and the occasional shut downs last only a few hours.

Accuracy.—The relation between gage heights and discharge is materially affected by backwater from log jams that form nearly every season on the head of an island a short distance below the section. Gage heights also show fluctuations caused by the operation of the mill gates. Results more or less unsatisfactory.

Cooperation.—Station maintained in cooperation with the Maine State Water Storage Commission.

Discharge measurements of St. Croix River near Woodland, Maine, in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
July 25[a]	F. E. Pressey	8.29	2,100
Oct. 10	....do	6.52	767

[a] Gage height affected by backwater from logs on rips below cable and gage.

Daily gage height, in feet, of St. Croix River near Woodland, Maine, for 1911.

[Simeon Phinney, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	.....	6.9	.....	8.6	6.9	7.9	7.8	7.8	.....	6.4	7.6
2	7.1	7.5	6.9	.....	8.5	6.9	.....	7.8	7.9	7.7	6.3	7.6
3	.....	.....	7.0	7.8	8.4	6.9	6.4	7.8	.....	7.7	6.3	.....
4	7.1	.....	7.1	7.8	8.4	.....	6.3	7.7	.....	7.6	6.3	7.5
5	7.1	.....	.....	7.9	8.3	6.8	6.3	7.7	7.6	7.6	.....	7.3
6	.....	.....	7.1	7.9	8.3	6.8	7.6	.....	7.6	7.6	6.3	7.1
7	.....	7.5	7.1	7.9	.....	6.8	7.9	7.8	7.6	7.6	6.3	7.0
8	.....	7.4	7.1	.....	8.2	.....	7.9	7.8	7.7	.....	6.4	7.0
9	7.0	.....	.....	.....	8.2	6.9	.....	7.7	7.7	7.3	6.4	7.0
10	.....	7.4	7.1	7.9	8.1	6.9	7.8	7.7	.....	7.2	6.5	.....
11	7.0	.....	.....	8.0	8.1	.....	7.8	7.7	.....	7.0	6.5	7.0
12	7.0	.....	.....	8.2	8.0	6.9	7.8	7.8	7.5	6.9	.....	7.2
13	.....	.....	.....	8.4	8.0	7.0	7.8	.....	7.4	6.8	6.5	7.3
14	.....	.....	7.1	8.4	.....	7.2	7.8	7.6	7.3	6.8	6.5	.....
15	7.0	.....	7.2	8.5	7.9	7.3	.....	7.6	7.2	.....	6.6	7.4
16	7.0	7.3	.....	.....	7.8	7.4	.....	7.7	7.2	6.9	6.7	.....
17	7.0	7.3	7.2	8.6	7.8	7.4	7.7	7.7	.....	6.7	6.8	.....
18	7.0	.....	.....	8.7	7.8	.....	7.7	7.7	7.1	6.6	6.8	.....
19	.....	.....	.....	8.9	7.7	7.3	7.7	7.7	7.1	6.6	.....	7.4
20	.....	.....	.....	9.0	7.6	7.4	7.8	.....	7.1	6.6	6.9	.....
21	.....	7.3	7.2	9.0	.....	7.4	7.8	7.6	7.1	6.6	7.1	.....
22	.....	.....	7.2	9.0	7.4	7.4	7.8	7.6	7.1	.....	7.3	7.4
23	.....	7.1	.....	.....	7.2	7.4	.....	7.7	7.1	6.0	7.6	.....
24	7.4	6.8	7.2	8.9	.....	7.4	7.9	7.7	.....	6.4	8.0	.....
25	7.5	.....	7.2	8.9	7.0	.....	.....	7.7	7.1	6.6	8.2	.....
26	7.5	.....	.....	8.8	.....	7.4	7.9	7.7	7.2	6.6	.....	9.0
27	.....	.....	7.2	8.7	.....	7.5	7.9	.....	7.4	6.6	8.0	.....
28	.....	.....	7.3	8.7	.....	7.5	7.9	7.7	7.6	6.6	7.9	.....
29	.....	.....	7.3	8.7	7.2	7.7	8.0	7.7	7.7	.....	7.9	8.4
30	7.5	.....	7.3	.....	7.0	7.9	.....	7.7	7.7	6.4	7.7	.....
31	7.5	.....	.....	.....	7.0	.....	7.8	7.8	.....	6.4	.....	.....

NOTE.—Relation of gage height to discharge probably not materially affected by ice during 1911. The gage heights during much of the year were affected by backwater from log jams, particularly during May, July, August, and September.

Daily discharge, in second-feet, of St. Croix River near Woodland, Maine, for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,310	1,760	1,100	1,830	2,870	1,100	2,280	1,510	1,510	1,400	670	1,880
2	1,310	1,760	1,100	1,990	2,720	1,100	1,480	1,510	1,630	1,400	590	1,880
3	1,310	1,760	1,200	2,140	2,570	1,100	670	1,510	1,510	1,400	590	1,820
4	1,310	1,760	1,310	2,140	2,570	1,100	590	1,400	1,400	1,280	590	1,760
5	1,310	1,760	1,310	2,280	2,420	1,000	590	1,400	1,280	1,280	590	1,530
6	1,280	1,760	1,310	2,280	2,420	1,000	1,280	1,460	1,280	1,280	590	1,310
7	1,250	1,760	1,310	2,280	2,350	1,000	1,630	1,510	1,280	1,280	590	1,200
8	1,230	1,640	1,310	2,280	2,280	1,050	1,630	1,510	1,400	1,100	670	1,200
9	1,200	1,640	1,310	2,280	2,280	1,100	1,570	1,400	1,400	1,100	670	1,200
10	1,200	1,640	1,310	2,280	2,140	1,100	1,510	1,400	1,330	1,100	750	1,200

Daily discharge, in second-feet, of St. Croix River near Woodland, Maine, for 1911—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11	1,200	1,620	1,310	2,420	2,140	1,100	1,510	1,400	1,250	1,100	750	1,200
12	1,200	1,600	1,310	2,720	2,010	1,100	1,510	1,510	1,180	1,100	750	1,420
13	1,200	1,580	1,310	3,030	2,010	1,200	1,510	1,400	1,080	1,000	750	1,530
14	1,200	1,560	1,310	3,030	1,940	1,420	1,510	1,280	975	1,000	750	1,580
15	1,200	1,550	1,420	3,190	1,880	1,530	1,470	1,280	880	1,050	830	1,640
16	1,200	1,530	1,420	3,280	1,760	1,640	1,440	1,400	880	1,100	910	1,640
17	1,200	1,530	1,420	3,360	1,760	1,640	1,400	1,400	835	910	1,000	1,640
18	1,200	1,530	1,420	3,530	1,760	1,580	1,400	1,400	790	830	1,000	1,640
19	1,280	1,530	1,420	3,890	1,640	1,530	1,400	1,400	790	830	1,050	1,640
20	1,350	1,530	1,420	4,070	1,530	1,640	1,510	1,340	790	839	1,100	1,640
21	1,420	1,530	1,420	4,070	1,480	1,640	1,510	1,280	790	830	1,310	1,640
22	1,490	1,420	1,420	4,070	1,420	1,640	1,510	1,280	790	615	1,530	1,640
23	1,560	1,310	1,420	3,980	1,310	1,640	1,570	1,400	790	400	1,880	2,250
24	1,640	1,000	1,420	3,890	1,260	1,640	1,630	1,400	790	670	2,420	2,850
25	1,760	1,020	1,420	3,890	1,200	1,640	1,630	1,400	790	830	2,720	3,460
26	1,760	1,040	1,420	3,710	1,260	1,640	1,630	1,400	880	830	2,670	4,070
27	1,760	1,060	1,420	3,530	1,310	1,760	1,630	1,400	1,080	830	2,420	3,720
28	1,760	1,080	1,530	3,360	1,360	1,760	1,630	1,400	1,280	830	2,280	3,380
29	1,760	.....	1,530	3,190	1,420	2,010	1,750	1,400	1,400	750	2,280	3,030
30	1,760	.....	1,530	3,030	1,200	2,280	1,630	1,400	1,400	670	2,010	3,000
31	1,760	.....	1,680	.....	1,200	.....	1,510	1,510	.....	670	.....	3,000

NOTE.—Daily discharge determined from three discharge rating curves: One appplicable Jan. 1 to Apr. 27, May 25 to July 5, and Oct. 12 to Dec. 31; another applicable from May 1 to May 20; the third applicable from July 6 to Oct. 7. The discharge Apr. 28 to 30, May 21 to 24, and Oct. 8 to 11 has been estimated to merge from one curve to another. Discharge interpolated for all days, not included in these estimated periods, for which there was no gage reading.

The mills above ran continuously, Sundays and week days, no shut down lasting more than a few hours.

Monthly discharge of St. Croix River near Woodland, Maine, for 1911.

[Drainage area, 1,420 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	1,760	1,200	1,400	0.986	1.14	B.
February	1,760	1,000	1,510	1.06	1.10	B.
March	1,680	1,100	1,370	.965	1.11	B.
April	4,070	1,830	3,030	2.13	2.38	B.
May	2,870	1,200	1,850	1.30	1.50	C.
June	2,280	1,000	1,420	1.00	1.12	C.
July	2,280	590	1,470	1.04	1.20	B.
August	1,510	1,280	1,410	.993	1.14	B.
September	1,630	790	1,120	.789	.88	C.
October	1,400	400	977	.688	.79	B.
November	2,720	590	1,220	.859	.96	B.
December	4,070	1,200	2,020	1.42	1.64	B.
The year	4,070	400	1,570	1.11	14.96	

WEST BRANCH OF ST. CROIX RIVER NEAR BAILEYVILLE, MAINE.

Location.—At highway bridge 1 mile from Baileyville railroad station, about 4 miles below Princeton, and about one-half mile above the mouth of Tomah Stream.

Records available.—May 10, 1910, to December 31, 1911. Data also in annual reports Maine State Water Storage Commission.

Drainage area.—509 square miles.

Gage.—Standard chain, attached to the floor of the bridge on the easterly span.

Channel.—Permanent, but broken by four piers of the bridge; during extreme high stages water is liable to flow around abutments of the bridge.

Discharge measurements.—Made from the lower side of the bridge.

Winter flow.—River generally does not freeze completely over.

Artificial control.—The lake system on West Branch is extensive and is largely under artificial regulation. The dams are operated both for log driving and storage for powers below.

Accuracy.—Relation between gage height and discharge probably somewhat affected by ice during the winter and to some extent also by backwater from log jams. Sufficient measurements have not yet been made to fully develop a discharge rating curve.

Cooperation.—Station maintained in cooperation with the Maine State Water Storage Commission.

Discharge measurements of West Branch of St. Croix River near Baileyville, Maine, in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
July 25	F. E. Pressey	5.05	694
Oct. 10	.....do	4.00	296
11	.....do	3.98	284

Daily gage height, in feet, of West Branch of St. Croix River near Baileyville, Maine, for 1911.

[Mrs. W. M. Woodard, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.5	4.5	4.1	4.4	5.9	4.0	4.00	5.05	4.55	4.35	3.75	4.70
2	.....	4.5	4.1	4.5	5.9	4.1	4.00	5.08	4.55	4.28	3.70	3.50
3	4.7	4.5	4.1	4.5	5.6	4.1	4.00	5.28	4.48	4.05	3.70	4.10
4	.....	4.5	4.0	4.6	5.8	4.1	4.00	5.00	4.45	4.08	3.70	4.90
5	.....	4.2	4.0	4.9	5.9	4.1	5.40	4.95	4.45	4.28	3.60	4.12
6	4.6	4.4	4.0	5.0	5.9	4.1	5.50	4.25	4.45	4.20	3.60	4.60
7	.....	4.5	3.7	5.5	5.9	4.1	5.50	4.75	4.45	4.20	3.70	4.30
8	4.9	4.7	3.7	5.5	5.9	4.2	5.40	4.75	4.40	4.00	3.75	4.00
9	4.9	4.0	4.2	5.5	6.2	4.2	5.30	4.70	4.40	4.10	3.80	4.10
10	4.9	4.0	4.0	5.5	6.2	4.1	5.10	4.62	4.40	4.10	3.78	4.05
11	4.8	4.2	4.0	5.6	5.7	4.1	5.00	4.40	4.35	4.00	3.75	4.20
12	4.7	4.2	4.0	5.6	5.5	4.2	5.20	4.50	4.35	4.08	3.70	4.40
13	4.7	4.4	4.0	5.7	4.7	4.2	5.20	4.48	4.25	4.15	3.80	4.40
14	4.6	4.4	4.0	5.7	4.0	4.4	5.50	4.35	4.15	3.90	3.80	4.55
15	4.6	4.5	4.0	5.8	4.2	4.5	5.30	4.45	4.15	3.92	4.00	4.50
16	4.5	4.5	4.0	5.8	4.4	4.7	5.30	4.58	4.15	3.90	4.10	4.60
17	4.3	4.5	4.2	5.9	4.5	4.9	5.20	4.50	4.00	3.85	4.10	4.65
18	4.3	4.6	4.2	5.9	5.5	5.0	5.10	4.45	4.00	3.90	4.40	4.48
19	4.0	4.6	4.0	6.0	5.5	5.3	5.10	4.35	4.35	3.80	4.40	4.55
20	4.0	4.5	4.0	6.0	5.5	5.3	5.40	4.10	4.25	3.80	4.40	4.38
21	4.5	4.5	4.0	5.9	5.3	5.0	5.40	4.35	4.15	3.85	4.25	4.28
22	4.5	4.4	4.0	5.9	5.0	5.8	5.20	4.62	4.10	3.78	3.85	4.40
23	4.5	4.4	4.0	5.7	4.8	5.8	5.00	4.58	4.25	3.85	4.70	4.60
24	4.5	4.4	4.0	5.7	4.3	5.0	5.10	4.55	4.20	3.88	4.00	5.70
25	4.6	4.3	4.0	5.8	4.3	4.9	5.40	4.45	4.20	3.80	4.20	5.80
26	4.6	4.3	4.1	5.8	4.2	5.8	5.00	4.50	4.40	3.80	4.28	5.78
27	4.5	4.2	4.2	5.7	4.2	5.6	5.00	4.55	4.40	3.80	4.00	5.30
28	4.5	4.2	4.3	5.7	4.0	5.8	5.02	4.55	4.40	3.80	3.90	5.10
29	4.5	.....	4.3	5.8	4.5	6.0	5.15	4.55	4.35	3.80	4.30	5.80
30	4.2	.....	4.4	5.8	3.9	6.0	5.20	4.50	4.30	3.70	4.30	6.00
31	4.2	.....	4.5	.....	4.0	.....	5.35	4.50	.....	3.72	.....	6.00

NOTE.—No notes by observer regarding ice at this station. Probably more or less effect from backwater during the first three months, but backwater during December is doubtful.

MACHIAS RIVER BASIN.

MACHIAS RIVER AT WHITNEYVILLE, MAINE.

Location.—Wooden highway bridge in the town of Whitneyville; 4 miles above Machias; 200 feet below a storage dam.

Records available.—October 17, 1903, to December 31, 1911. Data also in annual reports Maine State Water Storage Commission.

Drainage area.—465 square miles.

Gage.—Prior to October 3, 1905, the gage was located on the Washington County railroad bridge three-quarters of a mile below the present location. Backwater was occasionally experienced here, however, from the dam at Machias and on the above-mentioned date the gage was transferred to the present location, but no connection between the datum of the two gages has ever been made. On October 10, 1911, a standard chain gage was placed on the wooden highway bridge and referred to the same datum as the other gage on this bridge.

Channel.—Permanent.

Discharge measurements.—Still made at the railroad bridge, as the section there is better than above. Low-water measurements may be made by wading at a point 200 feet above the railroad bridge.

Winter flow.—Full ice conditions do not ordinarily exist to the extent of the complete freezing over of the river at the gage, although the discharge is more or less affected.

Log driving.—There is a certain amount of log driving every year and jams of short duration occasionally occur.

Artificial control.—The gates in the storage dam immediately above the station are opened and closed each day during low stages of the river. As a result considerable fluctuation occurs at such times.

Accuracy.—A fair rating curve has been developed except at low stages, when quantities are somewhat uncertain. The operations of the gates of the storage dam render results somewhat uncertain.

Cooperation.—The work is done in cooperation with the Maine State Water Storage Commission.

Discharge measurements of Machias River at Whitneyville, Maine, in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
July 26	F. E. Pressey	3.37	226
Oct. 12	do	3.99	506

Daily gage height, in feet, of Machias River at Whitneyville, Maine, for 1911.

[Ira S. Albee, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.3	3.2	3.7	7.4	5.9	5.7	5.0	3.3	3.2	3.5	3.3	5.0
2	4.6	3.2	3.7	6.5	5.9	5.7	4.8	3.2	3.2	3.5	3.3	4.7
3	4.9	3.2	3.65	6.0	5.8	5.6	4.5	3.15	3.2	3.5	3.3	4.3
4	5.4	3.2	3.6	5.5	5.7	5.7	4.3	3.1	3.3	3.4	3.2	4.3
5	5.2	3.7	3.6	5.0	5.6	5.8	4.1	3.1	3.4	3.4	3.2	4.3
6	4.8	3.8	3.6	5.5	5.5	5.9	4.0	3.1	3.5	3.35	3.2	4.4
7	4.4	3.9	3.55	6.0	5.5	6.0	3.8	3.1	3.5	3.3	3.2	4.5
8	4.2	4.0	3.4	6.0	5.6	6.3	3.6	3.1	3.5	3.3	3.3	4.5
9	4.2	4.0	3.4	6.0	5.7	6.5	3.5	3.05	3.4	3.3	3.4	4.6
10	4.2	4.0	3.35	5.9	5.7	6.6	3.4	3.0	3.4	4.1	3.5	4.7

Daily gage height, in feet, of Machias River at Whitneyville, Maine, for 1911— Contd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11	4.2	4.0	3.3	5.8	5.7	6.4	3.4	3.0	3.4	3.9	3.6	4.5
12	4.1	4.0	3.2	5.7	5.6	6.2	3.4	3.0	3.4	4.0	3.6	4.4
13	4.0	3.9	3.2	5.6	5.5	6.0	3.4	3.0	3.4	3.9	3.5	4.3
14	4.0	3.9	3.2	5.4	5.4	6.0	3.4	2.9	3.4	3.6	3.4	4.1
15	3.9	3.8	3.2	6.5	5.3	6.0	3.35	3.0	3.4	3.4	4.0	4.0
16	4.0	3.7	3.2	7.0	5.2	5.9	3.3	3.1	3.4	3.2	4.6	3.9
17	4.0	3.7	3.6	6.8	5.1	5.8	3.2	3.2	3.4	3.1	4.9	3.8
18	4.0	3.7	3.9	6.6	5.0	5.6	3.1	3.3	3.4	3.1	4.9	3.7
19	4.0	3.7	4.0	6.2	4.7	5.4	3.0	3.6	3.5	3.1	4.8	3.7
20	3.9	3.7	4.0	5.9	4.5	5.3	3.0	3.6	3.7	3.1	4.7	3.7
21	3.8	3.7	4.0	5.6	4.4	5.2	3.0	3.6	3.7	3.1	4.4	3.7
22	3.7	3.7	4.0	5.5	4.5	5.1	3.0	3.55	3.7	3.2	4.2	3.7
23	3.6	3.7	3.9	5.5	4.6	5.0	3.0	3.5	3.7	3.2	4.0	3.8
24	3.5	3.7	3.8	5.3	4.7	4.9	3.0	3.5	3.7	3.3	3.8	5.4
25	3.4	3.7	3.7	5.2	4.8	4.7	3.4	3.5	3.6	3.3	3.8	7.9
26	3.3	3.7	3.6	5.1	4.9	4.4	3.4	3.4	3.5	3.3	3.8	6.4
27	3.2	3.7	3.6	5.2	5.0	4.2	3.4	3.3	3.4	3.3	3.8	5.5
28	3.2	3.7	4.6	5.4	5.1	4.0	3.4	3.2	3.4	3.3	3.8	4.9
29	3.2	.....	6.9	5.7	5.3	4.0	3.4	3.2	3.5	3.3	4.5	4.6
30	3.2	.....	9.0	5.8	5.5	6.9	3.4	3.2	3.5	3.3	5.3	7.5
31	3.2	.....	8.3	.....	5.6	.....	3.4	3.2	.....	3.3	.....	4.7

NOTE.—Relation of gage height to discharge probably not materially affected by ice during the winter months. There are no notes regarding effect from log jams, but it is probable that for short intervals during April to June there may have been some backwater from this cause.

Daily discharge, in second-feet, of Machias River at Whitneyville, Maine, for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	642	161	343	3,010	1,720	1,560	1,070	191	161	260	191	1,070
2	814	161	343	2,200	1,720	1,560	937	161	161	260	191	875
3	1,000	161	322	1,800	1,640	1,490	755	146	161	260	191	642
4	1,350	161	300	1,420	1,560	1,560	642	132	191	224	161	642
5	1,210	343	300	1,070	1,490	1,640	534	132	224	224	161	642
6	937	387	300	1,420	1,420	1,720	482	132	260	208	161	698
7	698	433	280	1,800	1,420	1,800	387	132	260	191	161	755
8	587	482	224	1,800	1,490	2,040	300	132	260	191	191	755
9	587	482	224	1,800	1,560	2,200	260	118	224	191	224	814
10	587	482	208	1,720	1,560	2,290	224	105	224	534	260	875
11	587	482	191	1,640	1,560	2,120	224	105	224	433	300	755
12	534	482	161	1,560	1,490	1,960	224	105	224	482	300	698
13	482	433	161	1,490	1,420	1,800	224	105	224	433	260	642
14	482	433	161	1,350	1,350	1,800	224	81	224	300	224	534
15	433	387	161	2,200	1,280	1,800	208	105	224	224	482	482
16	482	343	161	2,650	1,210	1,720	191	132	224	161	814	433
17	482	343	300	2,470	1,140	1,640	161	161	224	132	1,000	387
18	482	343	433	2,290	1,070	1,490	132	191	224	132	1,000	343
19	482	343	482	1,960	875	1,350	105	300	260	132	937	343
20	433	343	482	1,720	755	1,280	105	300	343	132	875	343
21	387	343	482	1,490	698	1,210	105	300	343	132	698	343
22	343	343	482	1,420	755	1,140	105	280	343	161	587	343
23	300	343	433	1,420	814	1,070	105	260	343	161	482	387
24	260	343	387	1,280	875	1,000	105	260	343	191	387	1,350
25	224	343	343	1,210	937	875	224	260	300	191	387	3,380
26	191	343	300	1,140	1,000	698	224	224	260	191	387	2,120
27	161	343	300	1,210	1,070	587	224	191	224	191	387	1,420
28	161	343	814	1,350	1,140	482	224	161	224	191	387	1,000
29	161	.....	2,560	1,560	1,280	482	224	161	260	191	755	814
30	161	.....	4,580	1,640	1,420	2,560	224	161	260	191	1,280	3,100
31	161	.....	3,880	.....	1,490	.....	224	161	.....	191	.....	875

NOTE.—Daily discharge determined from a discharge rating curve well defined between 200 and 4,000 second-feet.

Monthly discharge of Machias River at Whitneyville, Maine, for 1911.

[Drainage area, 465 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	1,350	161	510	1.10	1.27	B.
February	482	161	355	.763	.79	B.
March	4,580	161	648	1.39	1.60	B.
April	3,010	1,140	1,700	3.66	4.08	B.
May	1,720	698	1,260	2.71	3.12	B.
June	2,560	482	1,500	3.23	3.60	B.
July	1,070	105	302	.649	.75	B.
August	300	81	174	.374	.43	C.
September	343	161	247	.531	.59	C.
October	534	132	229	.492	.57	C.
November	1,280	161	461	.991	1.11	B.
December	3,380	343	899	1.93	2.22	B.
The year	4,580	81	690	1.48	20.13	

UNION RIVER BASIN.

UNION RIVER AT AMHERST, MAINE.

Location.—At highway bridge three-fourths mile west of Amherst post office on road to Bangor, about a mile below the highway bridge at the old tannery dam.

Records available.—July 25, 1909, to December 31, 1911. Data also in annual reports Maine State Water Storage Commission.

Drainage area.—140 square miles.

Gage.—Standard chain, established June 2, 1910, and placed at same datum as old vertical gage nailed to log abutment.

Channel.—Gravel, but not liable to change except in an unusual flood.

Discharge measurements.—Made from downstream side of the bridge.

Winter flow.—Affected by ice.

Artificial control.—A few log-driving dams above the station, but the regimen of stream is only slightly affected by them.

Accuracy.—Relation between gage height and discharge is affected by ice and to a certain extent, but for short periods, by backwater from log jams. A good rating curve can probably be developed for periods during which the channel is open.

Cooperation.—Station maintained in cooperation with the Maine State Water Storage Commission.

Discharge measurements of Union River at Amherst, Maine, in 1911.

[F. E. Pressey, hydrographer.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Aug. 15	5.48	42	Sept. 28	5.76	68
15	5.48	40	28	5.76	70
Sept. 27	5.79	69	28	5.76	69
27	5.79	68	28	5.77	75
27	5.79	68	28	5.77	73
27	5.79	67	28	5.77	74
27	5.79	66	28	5.77	72
27	5.79	69	28	5.77	73
27	5.79	64	Oct. 19	5.40	37
27	5.79	66	19	5.40	38
27	5.79	72	19	5.38	38
27	5.79	72	19	5.38	38
27	5.79	72	19	5.32	34
28	5.76	70	19	5.32	32
28	5.76	68	19	5.31	32
			19	5.31	32

Daily gage height, in feet, of Union River at Amherst, Maine, for 1911.

[Floyd Sumner, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	6.70	6.98	10.30	9.42	6.48	6.00	6.05	5.56	5.78	5.40	7.03
2	.....	.....	.....	.....	9.30	6.65	5.85	6.20	5.58	5.73	5.35	7.22
3	.....	.....	.....	.....	9.10	6.60	5.80	6.30	5.56	5.72	5.32	7.90
4	8.45	6.70	6.98	.....	8.75	6.50	5.75	6.32	5.55	5.72	5.30	8.20
5	.....	.....	.....	9.60	8.50	6.48	5.70	6.22	5.46	5.90	5.28	8.50
6	.....	.....	.....	.....	8.30	6.45	5.65	6.10	5.40	5.85	5.25	9.21
7	8.30	.....	.....	.....	8.00	6.30	5.80	6.00	5.50	5.75	5.30	9.60
8	.....	7.35	6.98	11.40	7.90	6.20	5.70	5.90	5.50	5.72	5.90	9.24
9	.....	.....	.....	.....	7.68	6.10	5.67	5.80	5.50	5.52	5.73	8.50
10	.....	.....	.....	9.50	7.45	6.00	5.63	5.75	5.52	5.32	5.62	6.68
11	7.80	7.20	6.95	9.89	7.40	5.90	5.58	5.75	5.50	5.32	5.60	6.66
12	.....	.....	.....	9.82	7.35	5.90	5.53	5.70	5.48	5.37	5.60	6.72
13	.....	.....	.....	9.80	7.26	6.10	5.50	5.65	5.70	5.35	5.85	6.74
14	7.50	.....	.....	9.37	7.20	6.40	5.48	5.60	5.70	5.30	5.90	6.76
15	.....	7.10	6.95	10.90	7.10	6.50	5.40	5.48	5.60	5.30	5.98	6.76
16	.....	.....	.....	10.48	7.03	6.90	5.40	5.55	5.75	5.32	6.52	6.76
17	.....	.....	.....	10.30	6.90	7.50	5.35	5.48	5.72	5.37	6.45	6.75
18	7.00	7.10	7.50	10.40	6.80	7.30	5.35	5.45	5.70	5.58	6.35	6.75
19	.....	.....	.....	10.30	6.70	7.20	5.40	5.50	5.62	5.42	6.70	7.15
20	.....	.....	.....	10.20	6.63	7.10	5.38	5.50	5.65	5.30	6.70	7.70
21	7.00	.....	.....	10.15	6.55	7.00	5.35	5.52	5.70	5.18	6.62	8.93
22	.....	7.00	7.90	9.80	6.50	6.90	5.35	5.55	5.70	5.20	6.60	8.35
23	.....	.....	.....	9.50	6.70	6.70	5.40	5.58	5.75	5.60	6.75	10.00
24	.....	.....	.....	9.35	6.80	6.50	5.40	5.55	5.75	5.50	6.50	9.22
25	6.80	6.98	7.95	9.20	6.88	6.30	5.45	5.50	5.75	5.42	6.70	8.50
26	.....	.....	.....	9.20	6.90	6.20	5.45	5.45	5.77	5.35	6.75	8.38
27	.....	.....	.....	9.20	6.85	6.10	5.60	5.40	5.79	5.32	6.68	8.24
28	6.78	.....	.....	9.30	6.80	6.00	5.58	5.38	5.76	5.32	6.60	8.48
29	.....	.....	10.60	9.30	6.70	6.05	5.80	5.45	5.76	5.31	7.00	8.90
30	.....	.....	.....	9.60	6.65	6.05	5.95	5.50	5.80	5.30	7.27	10.80
31	.....	.....	.....	.....	6.50	.....	5.90	5.56	.....	5.30	.....	11.48

NOTE.—Relation of gage height to discharge affected by ice from Jan. 1 to Apr. 10. Much backwater was caused by ice jams during December. All gage readings during this period were probably to the water surface.

GREEN LAKE AT GREEN LAKE, MAINE.

Location.—At highway bridge at head of lake, 600 feet from Green Lake railroad station.

Records available.—July 1, 1909, to December 31, 1911.

Area of lake surface.—4.43 square miles.

Gage.—Staff, nailed to log abutment of highway bridge. Record shows the fluctuation of the lake level.

Cooperation.—The cooperative observer is Mr. H. F. Lord, of Green Lake, Maine.

Daily gage height, in feet, of Green Lake at Green Lake, Maine, for 1911.

[H. F. Lord, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	6.6	7.4	7.3	6.6	4.9	2.8	1.4	2.6
2	.....	6.6	7.4	7.3	6.6	4.8	2.7	1.4	2.6
3	.....	6.7	7.4	7.3	6.6	4.7	2.7	1.4	2.6
4	.....	6.8	7.4	7.3	6.5	4.6	2.7	1.4	2.7
5	.....	6.8	7.4	7.3	6.5	4.5	2.7	1.4	2.7
6	.....	6.8	7.4	7.3	6.5	4.4	2.7	1.5	2.8
7	.....	6.8	7.4	7.3	6.4	4.3	2.6	1.6	2.8
8	.....	6.8	7.4	7.3	6.4	4.2	2.6	1.6	2.8
9	4.0	6.8	7.4	7.3	6.4	4.1	2.5	1.7	2.9
10	4.1	6.8	7.4	7.3	6.4	4.0	2.4	1.7	2.9
11	4.2	6.9	7.4	7.2	6.3	3.9	2.3	1.7	3.0
12	4.3	6.9	7.4	7.2	6.3	3.8	2.1	1.8	3.0
13	4.4	7.0	7.5	7.2	6.3	3.7	2.1	1.8	3.0
14	4.6	7.0	7.5	7.2	6.3	3.6	2.0	1.8	3.1
15	4.8	7.0	7.5	7.2	6.3	3.6	1.9	1.9	3.1

Daily gage height, in feet, of Green Lake at Green Lake, Maine, for 1911—Continued.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16	5.0	7.0	7.6	7.1	6.2	3.5	1.8	1.9	3.1
17	5.2	7.0	7.6	7.1	6.2	3.5	1.8	1.9	3.2
18	5.4	7.0	7.6	7.1	6.1	3.4	1.8	2.0	3.2
19	5.6	7.0	7.6	7.0	6.1	3.3	1.8	2.0	3.3
20	5.7	7.0	7.6	7.0	6.0	3.2	1.8	2.1	3.3
21	5.7	7.0	7.6	7.0	5.9	3.2	1.7	2.1	3.4
22	5.9	7.1	7.6	7.0	5.8	3.1	1.7	2.2	3.4
23	5.9	7.1	7.5	6.9	5.7	3.1	1.6	2.2	3.6
24	6.0	7.2	7.5	6.9	5.6	3.0	1.6	2.2	3.9
25	6.1	7.2	7.5	6.9	5.4	3.0	1.6	2.3	4.1
26	6.2	7.3	7.4	6.8	5.3	3.0	1.6	2.3	4.2
27	6.3	7.3	7.4	6.8	5.2	2.9	1.6	2.3	4.3
28	6.3	7.3	7.4	6.8	5.2	2.8	1.5	2.4	4.4
29	6.4	7.3	7.3	6.8	5.1	2.8	1.5	2.4	4.5
30	6.5	7.4	7.3	6.7	5.1	2.8	1.5	2.5	4.5
31	.....	7.4	.....	6.7	5.0	.....	1.4	.....	4.6

GREEN LAKE STREAM AT LAKEWOOD, MAINE.

Location.—At highway bridge one-half mile below dam at outlet of Green Lake, one-half mile from Lakewood post office, and 8 miles from Ellsworth.

Records available.—July 1, 1909, to December 31, 1911. Data also in annual reports Maine State Water Storage Commission.

Drainage area.—47 square miles.

Gage.—Seven-foot staff, nailed to right-hand abutment, upstream side of bridge.

Channel.—Permanent; banks not subject to overflow.

Discharge measurements.—Made from lower side of bridge.

Winter flow.—Ice does not exist every year at this station.

Artificial control.—The dam one-half mile above the station at the outlet of the lake controls the storage of the lake, and computation does not show the natural flow.

Accuracy.—Results believed to be good for the length of record.

Cooperation.—Station maintained in cooperation with the Maine State Water Storage Commission.

The following discharge measurement was made by F. E. Pressey:
July 27, 1911: Gage height, 2.73 feet; discharge, 51 second-feet.

Daily gage height, in feet, of Green Lake Stream at Lakewood, Maine, for 1911.

[Martin A. Garland, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.40	2.30	3.05	2.38	2.85	2.50	2.70	3.20	2.90	2.70	2.70	2.40
2	2.40	2.30	3.02	2.40	2.85	2.50	2.70	3.20	3.30	2.70	2.45	2.38
3	2.40	2.30	3.00	2.40	2.85	2.50	2.70	3.20	3.30	2.70	2.45	2.38
4	2.40	3.40	2.98	2.42	2.82	2.50	2.70	2.70	3.30	2.70	2.45	2.35
5	2.40	3.40	2.98	2.42	2.80	2.50	2.70	2.70	3.30	3.20	2.45	2.35
6	2.40	3.40	2.90	2.45	2.80	2.52	2.70	2.70	3.30	3.20	2.45	2.35
7	2.40	3.40	2.90	2.45	2.80	2.55	2.70	2.70	3.30	3.20	2.45	2.35
8	2.40	3.38	2.90	2.48	2.80	2.55	2.70	2.70	3.30	3.20	2.45	2.35
9	2.40	3.35	2.90	2.50	2.80	2.55	2.70	2.70	3.25	3.20	2.45	2.35
10	2.40	3.32	2.88	2.50	2.50	2.55	2.70	2.70	3.22	3.20	2.45	2.35
11	2.30	3.30	2.88	2.50	2.50	2.55	2.70	2.70	3.20	3.20	2.45	2.35
12	2.30	3.30	2.85	2.50	2.50	2.65	2.70	2.70	3.20	3.20	2.45	2.35
13	2.30	2.85	2.85	2.50	2.50	2.65	2.70	2.70	3.20	3.20	2.45	2.35
14	2.30	2.40	2.82	2.52	2.50	2.65	2.70	2.70	3.20	3.20	2.45	2.32
15	2.30	2.40	2.82	2.52	2.50	2.65	2.70	2.70	3.20	2.40	2.45	2.35
16	2.30	2.40	2.82	2.55	2.50	2.65	2.70	2.70	3.20	2.40	2.45	2.32
17	2.30	3.20	2.80	2.58	2.50	2.65	2.70	2.70	3.20	2.40	2.45	2.32
18	2.30	3.20	2.80	2.80	2.50	2.65	2.70	2.70	3.18	2.40	2.45	2.32
19	2.30	3.20	2.80	2.85	2.50	2.65	2.70	3.00	3.15	2.40	2.45	2.32
20	2.30	3.20	2.80	2.88	2.50	2.65	2.70	3.00	3.15	2.90	2.45	2.32

Daily gage height, in feet, of Green Lake Stream at Lakewood, Maine, for 1911—Contd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
21	2.30	3.20	2.30	2.88	2.50	2.65	2.70	3.00	3.15	2.90	2.45	2.32
22	2.30	3.18	2.30	2.88	2.50	2.65	2.70	3.00	3.15	2.90	2.45	2.32
23	2.30	3.18	2.30	2.85	2.50	2.65	2.70	3.60	2.70	2.70	2.45	3.00
24	2.30	3.15	2.30	2.85	2.50	2.65	2.70	3.60	2.70	2.70	2.45	3.00
25	2.30	3.15	2.30	2.82	2.50	2.65	2.70	3.60	2.70	2.70	2.45	2.32
26	2.30	3.12	2.30	2.80	2.50	2.65	2.70	3.60	2.70	2.70	2.45	2.32
27	2.30	3.10	2.35	2.80	2.50	2.65	2.70	3.60	2.70	2.70	2.45	.....
28	2.30	3.08	2.38	2.80	2.50	2.68	2.70	2.90	2.70	2.70	2.45	.....
29	2.30	.....	2.38	2.80	2.50	2.70	3.20	2.90	2.70	2.70	2.40	.....
30	2.30	.....	2.38	2.80	2.50	2.70	3.20	2.90	2.70	2.70	2.40	.....
31	2.30	.....	2.40	.....	2.50	.....	3.20	2.90	.....	2.70	.....	.....

NOTE.—Relation of gage height to discharge probably not materially affected by ice during the winte months, the fluctuation in stage being due almost entirely to controlled flow.

Daily discharge, in second-feet, of Green Lake Stream at Lakewood, Maine, for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	19	12	108	18	70	28	49	146	77	49	49	19
2	19	12	101	19	70	28	49	146	177	49	24	18
3	19	12	96	19	70	28	49	146	177	49	24	18
4	19	211	92	21	65	28	49	49	177	49	24	16
5	19	211	92	21	62	28	49	49	177	146	24	16
6	19	211	77	24	62	30	49	49	177	146	24	16
7	19	211	77	24	62	33	49	49	177	146	24	16
8	19	204	77	26	62	33	49	49	177	146	24	16
9	19	194	77	28	62	33	49	49	162	146	24	16
10	19	184	74	28	28	33	49	49	152	146	24	16
11	12	177	74	28	28	33	49	49	146	146	24	16
12	12	177	70	28	28	44	49	49	146	146	24	16
13	12	70	70	28	28	44	49	49	146	146	24	16
14	12	19	65	30	28	44	49	49	146	146	24	13
15	12	19	65	30	28	44	49	49	146	19	24	16
16	12	19	65	33	28	44	49	49	146	19	24	13
17	12	146	62	36	28	44	49	49	146	19	24	13
18	12	146	62	62	28	44	49	49	141	19	24	13
19	12	146	62	70	28	44	49	96	132	19	24	13
20	12	146	62	74	28	44	49	96	132	77	24	13
21	12	146	12	74	28	44	49	96	132	77	24	13
22	12	141	12	74	28	44	49	96	132	77	24	13
23	12	141	12	70	28	44	49	288	49	49	24	96
24	12	132	12	70	28	44	49	288	49	49	24	96
25	12	132	12	65	28	44	49	288	49	49	24	13
26	12	123	12	62	28	44	49	288	49	49	24	13
27	12	119	16	62	28	44	49	288	49	49	24	13
28	12	114	18	62	28	47	49	77	49	49	24	13
29	12	.....	18	62	28	49	146	77	49	49	19	13
30	12	.....	18	62	28	49	146	77	49	49	19	13
31	12	.....	19	.....	28	.....	146	77	.....	49	.....	13

NOTE.—Daily discharge determined from a rating curve fairly well defined above about 20 second-feet Discharge Dec. 27 to 31 estimated.

Monthly discharge of Green Lake Stream at Lakewood, Maine, for 1911.

[Drainage area, 47 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area.)	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	19	12	14.3	0.304	0.35	C.
February	211	12	128	2.72	2.83	B.
March	108	12	54.5	1.16	1.34	B.
April	74	18	43.7	.930	1.04	B.
May	70	28	38.7	.823	.95	B.
June	49	28	39.5	.840	.94	B.
July	146	49	58.4	1.24	1.43	B.
August	288	49	107	2.28	2.63	B.
September	177	49	124	2.64	2.94	B.
October	146	19	78.2	1.66	1.91	B.
November	49	19	24.5	.521	.58	B.
December	96	13	19.9	.423	.49	B.
The year	288	12	60.3	1.28	17.43	

BRANCH LAKE NEAR ELLSWORTH, MAINE.

Location.—Near the intake to the wheels of the Branch Pond Lumber Co.'s Mill, at the lower end of Branch Lake, in Ellsworth, Maine.

Records available.—June 29, 1909, to October 20, 1911.

Area of lake surface.—4.33 square miles.

Gage.—Datum unchanged. Readings indicate height of lake.

Altitude.—Altitude as determined by Geological Survey, 236 feet above sea level, and this height was assumed as the height of the water surface at the time of the Union River surface reconnaissance.[1] In accordance with this assumption, the top of the mill-pond dam at the lower end of the lake is 240 feet above sea level.

Cooperation.—Station maintained in cooperation with the Maine State Survey Commission.

Daily gage height, in feet, of Branch Lake near Ellsworth, Maine, for 1911.

[H. B. Moor and L. H. Cushman, observers.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	2.25	3.25	3.75	4.6	6.45	5.95	5.3	4.45	3.3	2.6
2	2.3	3.25	3.75	4.7	6.45	5.95	5.3	4.4	3.25	2.55
3	2.35	3.25	3.7	4.75	6.5	5.9	5.3	4.35	3.25	2.5
4	2.6	3.25	3.65	4.75	6.5	5.9	5.3	4.3	3.2	2.5
5	2.75	3.3	3.6	4.8	6.5	5.9	5.3	4.3	3.15	2.45
6	2.8	3.4	3.6	4.85	6.55	5.85	5.25	4.3	3.1	2.45
7	2.8	3.45	3.55	4.9	6.55	5.8	5.25	4.3	3.1	2.45
8	2.8	3.5	3.5	4.95	6.55	5.75	5.2	4.25	3.05	2.45
9	2.9	3.5	3.5	5.25	6.55	5.7	5.2	4.2	3.05	2.4
10	3.0	3.55	3.45	5.4	6.5	5.7	5.2	4.2	3.05	2.4
11	3.05	3.6	3.4	5.45	6.5	5.7	5.15	4.15	3.0	2.4
12	3.1	3.6	3.4	5.45	6.45	5.6	5.1	4.1	3.0	2.35
13	3.1	3.6	3.4	5.5	6.4	5.65	5.05	4.1	3.0	2.35
14	3.15	3.6	3.35	5.55	6.4	5.7	5.0	4.05	2.95	2.35
15	3.15	3.6	3.35	5.6	6.4	5.7	4.95	4.0	2.9	2.3
16	3.2	3.65	3.35	5.7	6.4	5.75	4.9	3.95	2.85	2.25
17	3.2	3.65	3.35	6.0	6.35	5.75	4.85	3.9	2.85	2.2
18	3.2	3.65	3.35	6.1	6.3	5.75	4.8	3.85	2.85	2.2
19	3.2	3.65	3.4	6.2	6.25	5.75	4.75	3.8	2.8	2.2
20	3.15	3.7	3.45	6.25	6.2	5.75	4.7	3.8	2.8	2.2

[1] Water-Supply Paper U. S. Geol. Survey No. 281, 1912, p. 64.

Daily gage height, in feet, of Branch Lake near Ellsworth, Maine, for 1911—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
21	3.15	3.7	3.5	6.25	6.2	5.7	4.7	3.8	2.75	.....
22	3.15	3.7	3.5	6.3	6.15	5.65	4.65	3.7	2.75	.....
23	3.15	3.7	3.55	6.3	6.1	5.65	4.65	3.65	2.75	.....
24	3.15	3.7	3.55	6.35	6.1	5.6	4.6	3.6	2.75	.....
25	3.15	3.7	3.55	6.35	6.1	5.6	4.6	3.55	2.7	.....
26	3.15	3.7	3.55	6.4	6.1	5.5	4.6	3.5	2.7	.....
27	3.15	3.75	3.55	6.4	6.1	5.45	4.55	3.5	2.65	.....
28	3.15	3.75	3.65	6.4	6.1	5.4	4.5	3.45	2.65	.....
29	3.15	.....	4.0	6.4	6.05	5.35	4.55	3.4	2.65	.....
30	3.2	.....	4.25	6.45	6.0	5.3	4.55	3.3	2.65	.....
31	3.2	.....	4.5	.....	5.95	.....	4.5	3.3	.....	.....

BRANCH LAKE STREAM NEAR ELLSWORTH, MAINE.

Location.—At small highway bridge immediately below the sawmill at outlet of Branch Lake, 5 miles from Ellsworth.

Records available.—July 1, 1909, to December 31, 1911. Data also in annual reports Maine State Water Storage Commission.

Drainage area.—31 square miles.

Gage.—Seven-foot staff nailed to right abutment downstream side of bridge. Lake levels are taken on 8½-foot staff nailed to corner of mill near intake of wheel.

Channel.—Gravelly and permanent in natural condition; fills up from sawmill waste, but generally clears itself during spring freshets.

Discharge.—Measurements are made from highway bridge. Discharge can be made from the detailed readings of the time and amount of opening of the gates of the wheels, but the actual discharge through the wheels is not computed. The mill records are simply used to determine the lengths of time that the readings on the gage at the bridge apply. The fluctuations of the levels of the lake as recorded on the lake gage are also used in a general way in computing the discharge at the station.

Winter flow.—Relation between gage height and discharge as a rule affected by ice.

Artificial control.—The flow from the lake is regulated in the interest of the sawmill and power plants at Ellsworth.

Accuracy.—Results are uncertain largely because of the filling of the channel by sawdust.

Cooperation.—The cooperative observer is Mr. H. B. Moor at Ellsworth, Maine.

Discharge measurements of Branch Lake Stream near Ellsworth, Maine, in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
July 27	F. E. Pressey	4.95	129
Oct. 2	.....do	4.80	108
2	.....do	4.80	107
Dec. 28	.....do	4.30	44
28	.....do	3.93	14
28	.....do	4.20	36

Daily discharge, in second-feet, of Branch Lake Stream near Ellsworth, Maine, for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	35	10	5	66	65	72	91	57	69	35	21	23
2	35	10	5	5	65	72	5	57	69	60	21	26
3	35	10	29	73	68	68	5	57	5	60	20	30
4	40	10	56	69	65	12	5	57	69	60	20	48
5	35	10	56	69	65	72	61	57	69	60	10	30
6	35	10	56	66	65	99	61	5	69	60	23	26
7	35	10	48	73	12	72	61	54	69	35	23	26
8	35	10	48	73	46	72	61	54	90	29	23	26
9	35	8	48	5	46	95	5	54	54	29	23	27
10	35	8	51	76	46	68	61	5	5	29	10	22
11	30	8	51	80	95	12	61	54	54	29	23	22
12	30	8	5	80	95	68	61	54	54	29	11	22
13	19	8	54	80	46	68	61	5	54	29	26	22
14	12	8	54	80	12	68	61	54	51	29	26	22
15	12	8	54	80	72	68	61	54	54	18	26	24
16	12	8	54	5	72	68	5	54	54	30	26	25
17	10	8	54	80	72	72	61	54	5	30	26	26
18	8	8	54	80	72	12	61	66	51	30	26	26
19	18	8	5	80	72	95	61	66	51	30	12	25
20	18	10	54	80	72	95	61	23	51	30	34	25
21	18	10	54	80	12	95	61	91	51	29	26	24
22	18	10	54	80	72	95	61	94	51	29	26	24
23	18	10	54	12	95	72	5	94	51	28	47	40
24	18	10	54	72	95	72	61	69	5	27	47	56
25	15	8	54	72	95	12	61	69	51	26	23	53
26	15	8	5	72	68	72	61	54	51	26	11	50
27	15	5	54	65	68	65	57	20	51	25	26	45
28	10	5	57	65	12	65	57	69	48	24	26	40
29	10	.....	60	65	72	95	57	94	48	24	30	35
30	10	.....	64	65	72	68	5	69	56	23	26	35
31	10	.....	57	.....	95	.....	57	69	.....	22	.....	35

NOTE.—Daily discharge computed from gage heights and observer's additional notes of time to which gage heights apply depending on the operation of the two units at the lumber mill above. Discharge determined from a well-defined discharge rating curve.

Monthly discharge of Branch Lake Stream near Ellsworth, Maine, for 1911.

[Drainage area, 31 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	40	8	22.0	0.710	0.82	C.
February	10	5	8.7	.281	.29	C.
March	64	5	45.4	1.46	1.68	C.
April	80	5	64.9	2.09	2.33	C.
May	95	12	63.8	2.06	2.38	C.
June	99	12	68.0	2.19	2.44	C.
July	91	5	48.8	1.57	1.81	C.
August	94	5	55.9	1.80	2.08	C.
September	90	5	50.3	1.62	1.81	C.
October	60	18	33.0	1.06	1.22	C.
November	47	10	23.9	.771	.86	C.
December	56	22	31.0	1.00	1.15	C.
The year	99	5	43.2	1.39	18.87	

PENOBSCOT RIVER BASIN.

WEST BRANCH OF PENOBSCOT RIVER AT MILLINOCKET, MAINE.

Location.—Quakish Lake dam and the Millinocket mill of the Great Northern Paper Co. at Millinocket, Maine.

Records available.—January 11, 1901, to December 31, 1911. Data also in annual reports Maine State Water Storage Commission.

Drainage area.—1,880 square miles.

Gage.—Automatic recording gage of the Friez type at Quakish Lake dam and gages in the forebay and tail races at the mill.

Channel.—Crest of concrete dam.

Determination of discharge.—The flow is computed by considering the flow of the dam, the flow through the wheels, and the water used from time to time through the log sluices, filters, etc. The wheels were rated at Holyoke, Mass., before being placed in position. As the head under which they work, averaging about 110 feet, is much greater than the head under which they were tested, numerous tube-float measurements of flow in the channel leading to the mill have been made by engineers of the company, in order to determine just how much water the mill used under different conditions of gate opening. In addition to this, a series of current meter measurements were made by the United States Geological Survey to check the float measurements. It is believed that by means of the various checks on measurements, the estimates of discharge through the wheels are excellent. When the flow of the river is less than 2,500 second feet, all of the water generally flows through the wheels of the mill.

Winter flow.—No difficulty is experienced in the winter on account of ice affecting the estimates of discharge or the running of the wheels. Ferguson Pond, just above the entrance to the canal, eliminates effect from anchor ice.

Artificial control.—Storage dams at the outlet of North Twin Lake and at the outlet of Chesuncook Lake store water on a surface of about 65 square miles with a capacity of about 32,000,000,000 cubic feet. Except during the time (usually in August), that excess water has to be supplied for log driving on the river below Millinocket, and for a short time during the spring freshet, run-off is regulated by storage.

Accuracy.—Results believed to be very good for a station of this type.

Cooperation.—Results obtained and computations made by engineers of the Great Northern Paper Co., who furnish these data to the Survey.

Daily discharge, in second-feet, of Penobscot River at Millinocket, Maine, for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	a2,230	2,360	690	620	260	2,670	2,160	2,310	2,670	a2,030	2,260	2,120
2	1,940	2,360	690	a 620	2,200	2,670	a2,080	2,300	2,670	2,260	2,260	2,120
3	2,250	2,360	690	320	2,580	2,670	1,780	2,270	a1,910	2,260	2,260	a2,060
4	2,220	2,360	690	560	2,600	a2,670	1,770	2,360	1,760	2,260	2,260	2,120
5	2,120	a2,300	a 690	920	2,670	1,270	1,760	2,290	2,170	2,260	a2,050	2,120
6	2,170	1,420	680	1,350	2,660	2,670	2,330	a1,840	2,210	2,260	2,260	2,120
7	2,260	2,360	740	1,380	a2,660	2,670	2,320	2,250	2,220	2,260	2,260	2,120
8	a2,260	2,360	740	1,140	1,340	2,670	2,330	2,250	2,240	a2,030	2,260	1,990
9	2,040	2,080	740	a 970	2,710	2,670	a2,360	2,250	2,230	2,260	2,260	1,990
10	2,260	1,950	740	940	2,680	2,670	2,250	2,320	a1,800	2,260	2,260	a2,050
11	2,240	1,950	740	970	2,750	a2,670	2,360	2,370	2,260	2,260	2,260	1,990
12	2,240	a1,950	a 740	960	2,670	1,270	2,280	2,350	2,260	2,260	a2,000	1,990
13	2,240	1,400	460	560	2,670	2,670	2,330	a2,030	2,260	2,260	2,260	1,990
14	2,260	1,680	740	560	a2,670	2,670	2,320	2,460	2,260	2,260	2,260	1,990
15	a2,260	1,180	740	560	1,270	2,670	2,350	2,620	2,260	a2,030	2,260	1,990

a Sunday.

Daily discharge, in second-feet, of Penobscot River at Millinocket, Maine, for 1911—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16	1,940	1,380	740	a 970	2,670	2,670	a2,280	2,640	2,260	2,260	2,130	1,990
17	2,260	1,260	740	440	2,630	2,670	1,860	2,650	a1,840	2,260	2,120	a2,090
18	2,260	850	740	1,370	2,630	a2,670	2,250	2,400	2,260	2,260	2,100	2,000
19	2,260	a 690	a 740	1,380	2,670	1,270	2,280	2,460	2,260	2,260	a2,050	2,000
20	2,260	430	520	1,380	2,670	2,260	2,260	a1,820	2,260	2,260	2,120	2,000
21	2,250	690	730	1,380	a2,660	2,260	2,360	2,260	2,260	2,260	2,120	2,000
22	a2,210	690	730	1,380	1,270	2,260	2,360	2,250	2,260	a1,830	2,120	2,000
23	1,960	690	730	a1,120	2,670	2,260	a2,290	2,250	2,260	2,260	2,120	2,000
24	2,260	690	730	340	2,670	2,260	2,110	2,250	a1,910	2,260	2,120	a2,110
25	2,260	690	730	1,380	2,670	a2,260	2,370	2,250	2,260	2,260	2,120	2,190
26	2,260	a 690	a 730	1,780	2,630	1,220	2,370	2,200	2,260	2,260	a1,790	2,050
27	2,260	430	450	1,800	2,670	2,260	2,370	a2,000	2,260	2,260	2,120	2,050
28	2,160	690	620	1,800	a2,670	2,260	2,370	2,250	2,260	2,260	2,120	2,050
29	a2,260	.....	620	1,860	1,270	2,260	2,350	2,670	2,260	a2,030	2,120	1,470
30	1,920	.....	620	a2,100	2,670	2,260	a2,320	2,670	2,240	2,260	2,120	1,580
31	2,260	.....	620	.....	2,670	.....	1,760	2,670	.....	2,260	.....	a1,850

a Sunday.

Monthly discharge of Penobscot River at Millinocket, Maine, for 1911.

[Drainage area, 1,880 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	2,260	1,920	2,190	1.16	1.34
February	2,360	430	1,430	.761	.79
March	740	450	687	.365	.42
April	2,100	320	1,100	.585	.65
May	2,750	260	2,390	1.27	1.46
June	2,670	1,220	2,340	1.24	1.38
July	2,370	1,760	2,220	1.18	1.36
August	2,670	1,820	2,320	1.23	1.42
September	2,670	1,760	2,210	1.18	1.32
October	2,260	1,830	2,220	1.18	1.36
November	2,260	1,790	2,160	1.15	1.28
December	2,190	1,470	2,010	1.07	1.23
The year	2,750	260	1,940	1.03	14.01

PENOBSCOT RIVER AT WEST ENFIELD, MAINE.

Location.—At the steel highway bridge 1 mile below the village of West Enfield, Maine, and 1,000 feet below the mouth of Piscataquis River.

Records available.—January 1, 1902, to December 31, 1911; data published also in Annual Reports of the Maine State Water Storage Commission.

Drainage area.—6,600 square miles.

Gage.—Standard chain; datum unchanged.

Channel.—Permanent; broken by four bridge piers; banks high and rocky and not subject to overflow.

Winter flow.—Affected by ice.

Artificial control.—Flow of the river since about 1900 largely controlled by storage, principally in the lakes tributary to the West Branch. About 1 mile above the station is the dam of the International Paper Co., and the Piscataquis is dammed near its entrance into the Penobscot. Considerable water is held above these two dams at night. At low stages daily fluctuations in gage heights are caused by variations in wheel gate openings.

Accuracy.—Conditions favor the accurate determination of discharge; a fairly good discharge-rating curve has been developed.

Cooperation.—Station maintained in cooperation with the Maine State Water Storage Commission. Many of the discharge measurements are made by the students of the University of Maine under the direction of Prof. H. S. Boardman.

Discharge measurements of Penobscot River at West Enfield, Maine, in 1911.

[Made by University of Maine students under direction of Prof. H. S. Boardman.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Sept. 30	3.82	7,550	Oct. 14	2.44	4,230
30	3.82	7,670	14	2.44	4,130
Oct. 7	3.22	6,190	18	2.41	4,150
7	3.22	5,780	18	2.41	4,270

Daily gage height, in feet, of Penobscot River at West Enfield, Maine, for 1911.

[A. H. Hanson, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.8	.....	.....	.....	10.8	4.55	3.65	.....	3.3	3.65	2.9	5.75
2	3.75	.....	.....	.....	10.9	4.75	3.45	.....	3.2	3.5	2.9	5.3
3	3.8	4.2	3.3	5.1	10.85	4.9	3.35	2.9	2.55	3.35	2.7	4.45
4	4.15	.....	.....	.....	10.35	4.6	3.05	2.8	2.75	3.35	2.7	4.3
5	4.3	.....	.....	.....	9.4	4.15	2.9	2.6	3.05	3.3	2.25	4.15
6	4.45	.....	.....	5.3	8.3	4.2	3.0	2.6	3.05	3.25	2.25	4.35
7	4.65	.....	3.1	5.95	7.0	4.25	3.6	2.3	3.2	3.25	2.35	4.25
8	4.55	4.5	.....	6.3	6.6	4.15	3.5	2.25	3.35	2.8	2.9	4.3
9	4.4	.....	.....	6.7	6.5	3.85	3.2	2.2	3.35	2.4	3.4	4.45
10	4.4	4.3	3.0	7.0	6.85	3.6	2.95	2.3	3.2	2.5	3.25	4.15
11	4.35	.....	.....	7.15	6.55	3.55	2.9	2.5	3.05	2.55	3.15	4.15
12	4.2	.....	.....	7.45	6.35	3.25	3.0	2.3	3.3	2.4	3.2	4.35
13	4.2	.....	.....	7.35	6.2	3.65	3.0	2.15	3.1	2.5	2.9	4.75
14	4.15	4.2	2.9	7.8	5.95	4.5	2.9	1.95	3.15	2.3	2.8	7.55
15	3.95	.....	.....	9.3	5.35	4.65	2.85	2.2	3.15	2.1	3.3	7.15
16	3.75	.....	.....	9.45	5.3	4.65	2.6	2.55	3.0	2.1	4.0	6.55
17	.....	3.8	3.3	9.6	5.2	4.45	2.65	2.6	2.9	2.1	3.7	5.8
18	.....	.....	.....	9.5	4.9	4.65	2.8	2.75	2.95	2.45	3.6	5.25
19	.....	.....	.....	9.45	4.85	4.8	2.9	2.95	3.05	2.5	3.4	5.35
20	5.0	.....	.....	9.2	4.7	4.75	2.85	3.15	3.15	2.6	3.3	4.7
21	.....	3.4	3.4	9.05	4.4	4.6	2.85	3.35	3.1	2.6	3.8	4.9
22	.....	.....	.....	8.55	4.3	4.5	2.9	3.4	3.05	2.8	3.7	4.8
23	.....	.....	.....	8.0	4.55	4.15	2.85	3.05	3.15	3.05	3.4	4.7
24	4.3	3.6	3.4	7.4	4.55	3.9	2.8	3.1	3.15	3.15	3.3	6.25
25	.....	.....	.....	7.75	4.3	3.65	2.85	2.95	3.2	3.5	3.2	7.65
26	.....	.....	.....	8.2	4.05	3.1	2.8	2.8	3.35	3.3	3.15	7.5
27	4.4	.....	.....	8.7	4.25	3.25	.....	2.7	3.55	3.3	2.8	7.15
28	.....	3.2	3.6	9.5	3.85	3.6	.....	2.65	3.95	3.3	2.8	6.75
29	.....	.....	.....	10.1	3.75	3.6	.....	2.9	4.05	2.7	3.75	6.05
30	.....	.....	.....	10.65	4.05	3.5	.....	3.25	3.85	2.55	4.7	5.35
31	4.3	.....	4.4	.....	4.3	.....	.....	3.35	.....	2.7	.....	5.0

NOTE.—The relation of gage height to discharge affected by ice from Jan. 1 to Apr. 15. Probably not affected by backwater from ice during December. Gage heights were to water surface.

Daily discharge, in second-feet, of Penobscot River at West Enfield, Maine, for 1911.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	38,600	9,570	7,040	5,130	6,140	7,040	5,190	13,500
2	.....	39,200	10,200	6,520	5,160	5,890	6,650	5,190	12,000
3	.....	38,900	10,700	6,260	5,190	4,390	6,260	4,730	9,270
4	.....	36,000	9,720	5,540	4,960	4,840	6,260	4,730	8,830
5	.....	30,400	8,400	5,190	4,500	5,540	6,140	3,740	8,400
6	.....	24,400	8,540	5,420	4,500	5,540	6,020	3,740	8,980
7	.....	18,400	8,680	6,910	3,840	5,890	6,020	3,950	8,680
8	.....	16,800	8,400	6,650	3,740	6,260	4,960	5,190	8,830
9	.....	16,400	7,580	5,890	3,630	6,260	4,060	6,390	9,270
10	.....	17,800	6,910	5,300	3,840	5,890	4,280	6,020	8,400
11	.....	16,600	6,780	5,190	4,280	5,540	4,390	5,770	8,400
12	.....	15,800	6,020	5,420	3,840	6,140	4,060	5,890	8,980
13	.....	15,200	7,040	5,420	3,530	5,650	4,280	5,190	10,200
14	.....	14,300	9,420	5,190	3,140	5,770	3,840	4,960	20,800
15	.....	12,100	9,880	5,080	3,630	5,770	3,430	6,140	19,100
16	30,700	12,000	9,880	4,500	4,390	5,420	3,430	7,980	16,600
17	31,600	11,600	9,270	4,620	4,500	5,190	3,430	7,170	13,700
18	31,000	10,700	9,880	4,960	4,840	5,300	4,170	6,910	11,800
19	30,700	10,500	10,300	5,190	5,300	5,540	4,280	6,390	12,100
20	29,300	10,000	10,200	5,080	5,770	5,770	4,500	6,140	10,000
21	28,400	9,120	9,720	5,080	6,260	5,650	4,500	7,440	10,700
22	25,700	8,830	9,420	5,190	6,390	5,540	4,960	7,170	10,300
23	23,000	9,570	8,400	5,080	5,540	5,770	5,540	6,390	10,000
24	20,200	9,570	7,710	4,960	5,650	5,770	5,770	6,140	15,400
25	21,800	8,830	7,040	5,080	5,300	5,890	6,650	5,890	21,300
26	23,900	8,120	5,650	4,960	4,960	6,260	6,140	5,770	20,600
27	26,500	8,680	6,020	4,990	4,730	6,780	6,140	4,960	19,100
28	31,000	7,580	6,910	5,020	4,620	7,840	6,140	4,960	17,400
29	34,400	7,300	6,910	5,040	5,190	8,120	4,730	7,300	14,600
30	37,800	8,120	6,650	5,070	6,020	7,580	4,390	10,000	12,100
31	.....	8,830	.....	5,100	6,260	.....	4,730	.....	11,000

NOTE.—Daily discharge determined from a well-defined discharge rating curve.

Monthly discharge of Penobscot River at West Enfield, Maine, for 1911.

[Drainage area, 6,600 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	.....	.....	5,000	0.758	0.87	D.
February	.....	.....	3,500	.530	.55	D.
March	.....	.....	3,900	.591	.68	D.
April	37,800	.....	20,100	3.05	3.40	B.
May	39,200	7,300	16,100	2.44	2.81	A.
June	10,700	5,650	8,390	1.27	1.42	A.
July	7,040	4,500	5,390	.817	.94	A.
August	6,390	3,140	4,790	.726	.84	A.
September	8,120	4,390	5,930	.898	1.00	A.
October	7,040	3,430	5,070	.768	.89	A.
November	10,000	3,740	5,910	.895	1.00	A.
December	21,300	8,400	12,600	1.91	2.20	A.
The year	39,200	.....	8,110	1.23	16.60	

NOTE.—Discharge Jan. 1 to Apr. 15 estimated by means of climatologic records and consideration of the relative rate of run-off from other drainages in northern Maine.

Mean discharge Apr. 1 to 15 estimated 11,900 second-feet, ranging from about 7,000 to about 27,000 second-feet.

EAST BRANCH OF PENOBSCOT RIVER AT GRINDSTONE, MAINE.

Location.—Bangor & Aroostook Railroad bridge one-half mile south of railroad station at Grindstone, one-eighth mile above Grindstone Falls, and about 8 miles above the mouth at Medway.

Records available.—October 23, 1902, to December 31, 1911. Data also in annual reports Maine State Water Storage Commission.

Drainage area.—1,100 square miles.

Gage.—Standard chain; datum unchanged.

Channel.—Permanent; stream confined by abutments of bridge and broken by one pier at ordinary stages; velocity of current medium at moderate and high stages but sluggish at low water.

Discharge measurements.—Made from the railroad bridge.

Winter flow.—Affected by ice.

Artificial control.—Several dams are maintained at the outlets of a number of lakes and ponds near the source of the river and regulated in the interests of log driving. During the summer and fall gates are generally left open. The basin of the East Branch since about 1840 includes about 270 square miles of additional territory draining into Chamberlain Lake that formerly drained into the St. John River basin. This diversion is made through what is known as the Telos Canal.

Accuracy.—The relation between gage height and discharge is materially affected by backwater from log jams that form at the station and at Grindstone Falls immediately below and during the winter months by ice. Results believed to be fair for moderate and high stages, but uncertain for low water.

Cooperation.—Station maintained in cooperation with the Maine State Water Storage Commission.

The following discharge measurement was made by F. E. Pressey:
July 19, 1911: Gage height, 5.00 feet; discharge, 622 second-feet.

Daily gage height, in feet, of East Branch of Penobscot River at Grindstone, Maine, for 1911.

[George H. Goddard, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	4.70	.....	.....	9.38	6.30	6.52	5.25	4.88	5.90	4.72	.....
2	.....	.....	4.60	.....	9.70	6.00	6.50	5.20	4.82	5.80	4.60	.....
3	.....	.....	.....	.....	9.82	5.75	6.45	5.08	5.00	5.70	4.60	.....
4	5.20	.....	.....	.....	9.15	5.85	6.32	4.98	5.00	5.70	4.55	.....
5	.....	.....	.....	5.80	8.05	6.65	6.20	4.90	4.92	5.70	4.50	.....
6	.....	.....	.....	.....	7.10	6.95	6.15	4.90	4.95	5.58	4.50	5.70
7	.....	.....	.....	.....	6.70	6.85	6.02	4.88	4.45	5.40	4.82	.....
8	.....	4.70	.....	.....	6.70	6.12	5.90	4.85	5.15	5.25	5.08	.....
9	.....	.....	4.60	.....	6.95	5.12	5.78	4.80	4.88	5.10	5.20	.....
10	.....	.....	.....	.....	6.80	5.10	5.65	4.78	4.72	4.75	5.20	.....
11	5.00	.....	.....	.....	6.65	5.10	5.52	4.12	4.70	4.52	5.25	5.80
12	.....	.....	.....	6.40	6.68	6.15	5.40	4.10	4.60	4.50	5.48	.....
13	.....	.....	.....	.....	6.80	6.55	5.30	4.10	4.70	4.50	5.72	.....
14	.....	.....	4.70	.....	6.80	5.75	5.25	4.10	4.62	4.50	5.95	6.90
15	.....	.....	.....	.....	6.72	5.60	5.18	4.05	4.82	4.50	5.98	.....
16	.....	4.70	.....	.....	6.52	5.60	5.10	4.65	4.90	4.50	5.90	.....
17	.....	.....	.....	.....	6.42	6.50	5.02	4.78	4.90	4.45	5.68	6.50
18	4.85	.....	.....	.....	6.50	7.08	5.00	4.55	4.80	4.42	5.58	.....
19	.....	.....	.....	7.75	6.45	7.05	5.00	4.80	4.62	4.48	5.50	.....
20	.....	.....	.....	7.45	6.35	6.92	4.92	5.68	4.60	4.58	5.50	6.10

Daily gage height, in feet, of East Branch of Penobscot River at Grindstone, Maine, for 1911—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
21	.....	.....	.....	7.05	6.30	6.90	4.95	5.20	4.60	4.60	5.38	.....
22	.....	.....	4.80	6.80	7.25	6.80	4.95	4.90	4.60	4.68	5.18	.....
23	.....	.....	.....	6.55	7.60	6.20	4.92	4.75	4.70	4.85	5.10	.....
24	.....	4.70	.....	6.42	6.90	5.35	4.90	4.58	4.70	5.00	5.10	.....
25	.....	.....	.....	6.85	5.90	5.20	4.90	4.50	4.75	5.05	5.10	.....
26	4.75	.....	.....	7.32	5.80	5.55	4.88	4.85	5.30	5.00	5.05	6.70
27	.....	.....	.....	7.60	5.70	6.78	4.80	5.00	5.90	4.98	.....	.....
28	.....	.....	.....	8.20	5.70	6.45	4.72	5.00	6.00	4.90	.....	7.20
29	.....	.....	.....	8.75	5.70	6.70	4.95	5.10	5.90	4.85	5.80	.....
30	.....	.....	6.30	9.10	6.45	6.62	5.15	5.05	5.90	4.80	.....	.....
31	.....	.....	.....	.....	6.80	.....	5.30	4.92	.....	4.80	.....	7.00

NOTE.—Relation of gage height to discharge affected by ice from Jan. 1 to Apr. 18 and from Nov. 26 to Dec. 31. Gage heights during these periods were probably to water surface. There is no record regarding log driving. Relation of gage height to discharge was probably not materially affected by logs during the year.

Daily discharge, in second-feet, of East Branch of Penobscot River at Grindstone, Maine, for 1911.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	.....	8,480	2,120	2,480	790	549	1,520	465
2	.....	9,250	1,660	2,450	750	516	1,380	405
3	.....	9,550	1,320	2,360	668	620	1,250	405
4	.....	7,930	1,450	2,150	608	620	1,250	382
5	.....	5,440	2,700	1,960	560	572	1,250	360
6	.....	3,510	3,230	1,880	560	590	1,110	360
7	.....	2,790	3,050	1,690	549	338	920	516
8	.....	2,790	1,840	1,520	532	715	790	668
9	.....	3,230	694	1,350	505	549	680	750
10	.....	2,960	680	1,190	495	465	480	750
11	.....	2,700	680	1,040	216	455	369	790
12	.....	2,760	1,880	920	210	405	360	1,000
13	.....	2,960	2,540	830	210	455	360	1,280
14	.....	2,960	1,320	790	210	415	360	1,590
15	.....	2,820	1,130	736	198	516	360	1,630
16	.....	2,480	1,130	680	430	560	360	1,520
17	.....	2,310	2,450	632	495	560	338	1,230
18	.....	2,450	3,470	620	382	505	324	1,110
19	4,800	2,360	3,420	620	505	415	351	1,020
20	4,190	2,200	3,180	572	1,230	405	396	1,020
21	3,410	2,120	3,140	590	750	405	405	902
22	2,960	3,800	2,960	590	560	405	445	736
23	2,540	4,490	1,960	572	480	455	532	680
24	2,310	3,140	875	560	396	455	620	680
25	3,050	1,520	750	560	360	480	650	680
26	3,930	1,380	1,080	549	532	830	620	650
27	4,490	1,250	2,930	505	620	1,520	608	600
28	5,770	1,250	2,360	465	620	1,660	560	550
29	7,000	1,250	2,790	590	680	1,520	532	1,380
30	7,810	2,360	2,650	715	650	1,520	505	1,200
31	.....	2,960	.....	830	572	.....	505	.....

NOTE.—Daily discharge determined from a discharge rating curve fairly well defined between 400 and 10,000 second-feet. Discharge Nov. 27, 28, and 30 estimated.

Monthly discharge of East Branch of Penobscot River at Grindstone, Maine, for 1911.

[Drainage area,[a] 1,100 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	.....	.....	450	0.409	0.47	D.
February	.....	.....	350	.318	.33	D.
March	.....	.....	500	.455	.52	D.
April	7,810	.....	2,850	2.59	2.89	C.
May	9,550	1,250	3,470	3.15	3.63	A.
June	3,470	680	2,050	1.86	2.08	A.
July	2,480	465	1,060	.964	1.11	A.
August	1,230	198	527	.479	.55	A.
September	1,660	338	649	.590	.66	A.
October	1,520	324	651	.592	.68	A.
November	1,630	360	832	.756	.84	A.
December	.....	.....	1,230	1.12	1.29	D.
The year	.....	.....	1,220	1.11	15.05	

[a] Includes Chamberlain Lake drainage area of 270 square miles.

NOTE.—Discharge Jan. 1 to Apr. 18 and Nov. 27-28 and Nov. 30 to Dec. 31 estimated by means of climatologic records, comparison of the discharge at other stations in northern Maine, and consideration of the observer's notes regarding ice.

Mean discharge Apr. 1 to 18 estimated 1,840 second-feet.

MATTAWAMKEAG RIVER AT MATTAWAMKEAG, MAINE.

Location.—At Maine Central Railroad bridge at the village of Mattawamkeag, half a mile above the mouth of the river.

Records available.—August 26, 1902, to December 31, 1911. Data also in annual reports Maine State Water Storage Commission.

Drainage area.—1,500 square miles.

Gage.—Standard chain; datum unchanged.

Channel.—Permanent; broken by two bridge piers.

Discharge measurements.—Made from the bridge, which is slightly oblique to the current; low-water measurements made by wading at a point about 1 mile above the station.

Winter flow.—Affected by ice.

Artificial control.—Dams are maintained at the outlets of several of the large lakes and ponds, but the stored water is used only for log driving.

Accuracy.—Relation between gage height and discharge is at times affected by backwater from log jams that form during short periods in the log-driving season, and, during the winter months, by ice. A very good open-channel discharge rating curve has been developed.

Cooperation.—Station maintained in cooperation with the Maine State Water Storage Commission.

The following discharge measurement was made by F. E. Pressey:

October 3, 1911: Gage height, 4.48 feet; discharge, 1,170 second-feet

Daily gage height, in feet, of Mattawamkeag River at Mattawamkeag, Maine, for 1911.

[W. T. Mincher, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	.....	.....	7.0	9.25	5.0	4.1	3.3	4.3	4.8	4.15	6.2
2	.....	.....	.....	.....	9.55	5.25	3.9	3.4	4.3	4.7	4.1	6.3
3	.....	.....	.....	.....	9.35	5.2	3.8	3.5	4.3	4.6	4.05	6.4
4	.....	5.5	5.5	.....	9.15	5.3	3.7	3.5	4.25	4.5	4.0	6.5
5	.....	.....	.....	.....	8.7	5.4	3.7	3.4	4.2	4.4	4.0	6.4
6	.....	.....	.....	.....	8.35	5.5	3.7	3.4	4.1	4.4	4.0	6.15
7	5.8	.....	.....	.....	8.15	5.5	3.7	3.3	4.0	4.3	4.0	5.9
8	.....	.....	.....	7.8	7.7	5.4	3.6	3.2	3.9	4.3	4.25	5.8
9	.....	.....	.....	.....	7.3	5.4	3.5	3.2	3.9	4.25	4.45	5.6
10	.....	.....	.....	.....	6.85	5.4	3.5	3.2	3.9	4.2	4.5	5.6
11	.....	5.6	5.7	.....	6.65	5.5	3.4	3.2	4.0	4.2	4.5	5.5
12	.....	.....	.....	.....	6.5	5.5	3.3	3.3	4.0	4.1	4.5	5.4
13	.....	.....	.....	7.7	6.4	5.75	3.3	3.2	4.1	4.05	4.6	5.75
14	5.8	.....	.....	7.7	6.4	5.9	3.2	3.1	4.1	4.0	4.7	6.2
15	.....	.....	.....	7.85	6.1	5.95	3.3	3.0	4.1	4.0	4.85	7.05
16	.....	.....	.....	8.3	6.0	5.7	3.2	3.1	4.2	3.9	5.25	7.2
17	.....	.....	.....	8.6	5.9	5.4	3.1	3.1	4.1	3.8	5.4	7.05
18	.....	5.3	5.9	8.7	5.65	5.3	3.0	3.1	4.1	3.8	5.4	6.75
19	.....	.....	.....	8.9	5.5	5.2	3.0	3.45	4.0	3.7	5.3	6.5
20	.....	.....	.....	9.15	5.6	5.1	3.1	3.75	4.0	3.8	5.3	6.4
21	5.3	.....	.....	8.9	5.6	5.0	3.1	4.2	4.0	3.9	5.2	6.4
22	.....	.....	.....	8.8	5.5	4.9	3.2	.....	4.1	3.9	5.1	6.55
23	.....	.....	.....	8.7	5 5	4.8	3.1	.....	4.1	4.15	5.0	6.7
24	.....	.....	.....	8.5	5.5	4.7	3.0	.....	4.1	4.4	4.9	6.95
25	.....	5.4	6.0	8.4	5.5	4.5	3.0	.....	4.2	4.5	4.8	7.45
26	.....	.....	.....	8.25	5.4	4.3	3.1	3.95	4.2	4.6	4.9	7.7
27	.....	.....	.....	8.1	5.3	4.2	3.2	4.1	4.45	4.6	5.1	7.6
28	5.4	.....	.....	8.3	5.3	4.2	3.2	4.1	4.75	4.5	5.4	7.35
29	.....	.....	.....	8.85	5.2	4.3	3.2	4.2	4.75	4.6	5.75	7.2
30	.....	.....	.....	9.05	5.1	4.2	3.3	4.2	4.75	4.45	6.05	7.1
31	.....	.....	.....	.....	4.9	.....	3.3	4.3	.....	4.2	.....	7.0

NOTE.—The relation of gage height to discharge was affected by ice from Jan. 1 to Apr. 12. Probably not affected by backwater from ice during December. Gage heights to water surface.

Daily discharge, in second-feet, of Mattawamkeag River at Mattawamkeag, Maine, for 1911.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	10,400	1,690	736	295	906	1,440	777	3,520
2	.....	11,200	2,020	590	334	906	1,320	736	3,710
3	.....	10,700	1,950	525	375	906	1,210	698	3,900
4	.....	10,100	2,080	470	375	862	1,100	660	4,090
5	.....	8,980	2,220	470	334	818	1,000	660	3,900
6	.....	8,110	2,360	470	334	736	1,000	660	3,430
7	.....	7,630	2,360	470	295	660	906	660	2,980
8	.....	6,580	2,220	420	258	590	906	862	2,820
9	.....	5,700	2,220	375	258	590	862	1,050	2,500
10	.....	4,780	2,220	375	258	590	818	1,100	2,500
11	.....	4,380	2,360	334	258	660	818	1,100	2,360
12	.....	4,090	2,360	295	295	660	736	1,100	2,220
13	6,580	3,900	2,740	295	258	736	698	1,210	2,740
14	6,580	3,900	2,980	258	223	736	660	1,320	3,520
15	6,920	3,340	3,070	295	190	736	660	1,500	5,180
16	7,990	3,160	2,660	258	223	818	590	2,020	5,490
17	8,730	2,980	2,220	223	223	736	525	2,220	5,180
18	8,980	2,580	2,080	190	223	736	525	2,220	4,580
19	9,490	2,360	1,950	190	354	660	470	2,080	4,090
20	10,100	2,500	1,820	223	498	660	525	2,080	3,900

Daily discharge, in second-feet, of Mattawamkeag River at Mattawamkeag, Maine, for 1911—Continued.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
21	9,490	2,500	1,690	223	818	660	590	1,950	3,900
22	9,230	2,360	1,560	258	779	736	590	1,820	4,180
23	8,980	2,360	1,440	223	741	736	777	1,690	4,480
24	8,480	2,360	1,320	190	702	736	1,000	1,560	4,980
25	8,230	2,360	1,100	190	664	818	1,100	1,440	6,030
26	7,870	2,220	906	223	625	818	1,210	1,560	6,580
27	7,510	2,080	818	258	736	1,050	1,210	1,820	6,360
28	7,990	2,080	818	258	736	1,380	1,100	2,220	5,810
29	9,360	1,950	906	258	818	1,380	1,210	2,740	5,490
30	9,880	1,820	818	295	818	1,380	1,050	3,250	5,280
31	.....	1,560	.....	295	906	.....	818	.....	5,080

NOTE.—Daily discharge determined from a well-defined discharge rating curve.

Monthly discharge of Mattawamkeag River at Mattawamkeag, Maine, for 1911.

[Drainage area, 1,500 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	.....	.....	1,100	0.733	0.85	D.
February	.....	.....	800	.533	.56	D.
March	.....	.....	1,200	.800	.92	D.
April	10,100	.....	6,530	4.35	4.85	C.
May	11,200	1,560	4,550	3.03	3.49	A.
June	3,070	818	1,900	1.27	1.42	A.
July	736	190	327	.218	.25	A.
August	906	190	458	.305	.35	A.
September	1,380	590	813	.542	.60	A.
October	1,440	470	885	.590	.68	A.
November	3,250	660	1,490	.993	1.11	A.
December	6,580	2,220	4,220	2.81	3.24	A.
The year	11,200	190	2,030	1.35	18.32	

NOTE.—Discharge Jan. 1 to Apr. 12 estimated by means of climatologic records and discharge from adjacent drainages. Mean discharge Apr. 1 to 12, estimated, 3,620 second-feet.

PISCATAQUIS RIVER NEAR FOXCROFT, MAINE.

Location.—At Low's highway bridge about halfway between Guilford and Foxcroft, three-fourths mile above the mouth of Black Stream and 3 miles below Mill Stream.

Records available.—August 17, 1902, to December 31, 1911. Data also in annual reports of the Maine State Water Storage Commission.

Drainage area.—286 square miles.

Gage.—Staff, attached to left abutment of bridge; datum unchanged.

Channel.—Permanent; banks high and overflowed only during extreme floods.

Discharge measurements.—At medium and high stages made from the bridge; at low stages made by wading either above or below the bridge, where the bed is of fine gravel but the velocity greater than at the bridge.

Winter flow.—Affected by ice during some years.

Artificial control.—The stream is used to develop power at several manufacturing plants above the station.

Accuracy.—The relation between gage height and discharge at low stages is considerably affected by the irregular use of the water at the mills; during some winters it is also affected by ice; little if any affected by backwater from log jams, as little log driving is now done on the river. A very good rating curve has been developed for medium stages, but the curve for high and low stages is not yet accurately defined.

Cooperation.—Station maintained in cooperation with the Maine State Water Storage Commission.

The following discharge measurement was made by F. E. Pressey:
August 3, 1911: Gage height, 2.67 feet; discharge, 275 second-feet.

Daily gage height, in feet, of Piscataquis River near Foxcroft, Maine, for 1911.

[A. F. D. Harlow, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.4	3.25	2.75	5.25	6.2	2.3	2.3	2.55	1.95	1.9	2.6	3.3
2	2.2	3.25	2.75	5.2	6.05	3.05	1.5	2.2	2.0	1.95	2.45	3.2
3	2.5	3.35	2.75	5.0	5.65	2.95	1.5	2.2	2.0	1.95	2.45	3.15
4	2.75	3.3	2.75	4.95	5.1	2.75	1.5	2.05	1.95	2.25	2.35	3.25
5	2.75	3.0	2.75	4.65	4.6	2.55	1.65	1.95	1.95	2.2	1.95	3.45
6	2.85	3.1	2.75	4.5	4.4	2.45	1.75	1.9	1.95	2.2	2.35	3.35
7	3.1	3.05	2.85	4.3	4.4	2.0	1.75	1.85	1.95	2.15	3.1	3.1
8	3.25	3.35	2.85	5.55	4.35	2.0	1.75	1.85	1.95	1.95	3.6	3.0
9	3.25	3.1	2.95	5.4	4.05	1.95	1.75	1.85	1.95	1.95	3.4	2.9
10	3.2	3.1	2.75	5.05	3.9	1.85	1.75	1.9	1.8	1.95	3.25	2.9
11	3.15	3.1	2.75	5.1	3.9	1.85	1.75	1.9	1.9	1.95	3.25	2.95
12	2.75	3.0	2.65	5.15	3.85	1.85	1.65	1.9	1.9	1.95	2.7	4.45
13	2.75	3.1	2.65	5.15	3.5	2.25	1.65	1.85	1.9	2.05	3.6	4.8
14	2.95	3.1	2.75	5.75	3.4	2.4	1.65	1.85	1.9	2.05	3.7	5.45
15	2.9	3.25	2.75	7.25	2.95	3.05	1.65	1.9	1.9	1.9	3.25	5.1
16	2.95	3.25	2.75	7.6	2.95	2.8	1.65	1.9	1.9	1.95	3.25	4.45
17	2.85	3.25	2.75	6.7	2.8	2.65	1.5	1.75	2.0	1.95	3.6	3.7
18	2.75	3.25	2.75	6.7	2.8	2.65	1.5	1.7	2.05	1.95	3.2	3.7
19	2.8	2.65	2.0	5.65	2.75	2.55	1.5	1.7	2.05	2.0	3.1	3.7
20	3.0	2.8	2.6	5.5	2.65	2.3	1.5	1.7	2.1	2.35	3.15	3.55
21	2.95	2.8	2.6	5.0	2.6	2.3	1.5	1.8	2.1	2.7	3.2	3.45
22	2.8	2.85	2.6	4.3	2.6	2.25	1.5	1.8	2.0	2.7	3.1	3.6
23	2.75	2.95	2.6	4.05	2.5	2.25	1.5	1.95	1.9	3.15	3.05	4.25
24	2.75	2.95	2.6	4.25	2.35	2.25	2.0	1.95	1.8	2.95	3.05	4.85
25	3.05	2.95	2.6	4.35	2.35	2.65	1.9	1.95	1.75	2.8	3.05	4.55
26	3.05	1.95	2.5	4.35	2.3	2.65	1.75	1.75	1.75	2.2	3.05	4.15
27	3.25	2.95	3.1	6.0	2.3	2.65	1.8	1.5	2.0	2.2	3.05	3.8
28	3.15	2.75	3.55	6.2	1.9	2.65	2.15	2.15	2.1	2.25	3.05	3.85
29	2.8	.....	4.35	6.45	1.9	2.65	2.25	2.15	1.95	2.25	3.85	5.45
30	3.0	.....	4.7	6.45	1.9	2.65	2.45	2.15	1.95	2.25	4.0	6.05
31	2.85	.....	5.25	.....	1.9	.....	2.8	2.15	.....	2.25	.....	5.85

NOTE.—The relation of gage height to discharge was probably affected by ice from about Jan. 1 to Apr. 14 and from about Dec. 28 to 31. Gage readings are assumed to have been taken to water surface.

Daily discharge, in second-feet, of Piscataquis River near Foxcroft, Maine, for 1911.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	4,340	123	123	199	58	51	220	638
2	.....	4,060	470	19	100	64	58	163	569
3	.....	3,350	405	19	100	64	58	163	536
4	.....	2,490	292	19	72	58	111	135	604
5	.....	1,840	199	28	58	58	100	58	746
6	.....	1,620	163	36	51	58	100	135	674
7	.....	1,620	64	36	46	58	90	502	502
8	.....	1,560	64	36	46	58	58	858	437
9	.....	1,260	58	36	46	58	58	709	374
10	.....	1,110	46	36	51	40	58	604	374

Daily discharge, in second-feet, of Piscataquis River near Foxcroft, Maine, for 1911—Con.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11	.....	1,110	46	36	51	51	58	604	405
12	.....	1,070	46	28	51	51	58	267	1,670
13	.....	782	111	28	46	51	72	858	2,080
14	.....	709	148	28	46	51	72	938	3,020
15	6,330	405	470	28	51	51	51	604	2,490
16	7,010	405	318	28	51	51	58	604	1,670
17	5,270	318	243	19	36	64	58	858	938
18	5,270	318	243	19	31	72	58	569	938
19	3,350	292	199	19	31	72	64	502	938
20	3,100	243	123	19	31	81	135	536	820
21	2,350	220	123	19	40	81	267	569	746
22	1,510	220	111	19	40	64	267	502	858
23	1,260	180	111	19	58	51	536	470	1,460
24	1,460	135	111	64	58	40	405	470	2,150
25	1,560	135	243	51	58	36	318	470	1,780
26	1,560	123	243	36	36	36	100	470	1,350
27	3,970	123	243	40	19	64	100	470	1,020
28	4,340	51	243	90	90	81	111	470	800
29	4,800	51	243	111	90	58	111	1,070	600
30	4,800	51	243	163	90	58	111	1,210	500
31	.....	51	.....	318	90	.....	111	.....	500

NOTE.—The daily discharge is determined from a rating curve well defined between about 20 and 4,000 second-feet. Discharge Dec. 28 to 31 estimated.

Monthly discharge of Piscataquis River near Foxcroft, Maine, for 1911.

[Drainage area, 286 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	.....	.....	150	0.524	0.60	D.
February	.....	.....	120	.420	.44	D.
March	.....	.....	250	.874	1.01	D.
April	7,010	.....	2,300	8.04	8.97	C.
May	4,340	51	976	3.41	3.93	A.
June	470	46	192	.671	.75	A.
July	318	19	50.6	.177	.20	B.
August	199	19	60.1	.210	.24	B.
September	81	36	57.9	.202	.23	B.
October	536	51	125	.437	.50	A.
November	1,210	58	535	1.87	2.09	A.
December	3,020	374	1,040	3.64	4.20	B.
The year	7,010	19	488	1.71	23.16	

NOTE.—Discharge Jan. 1 to Apr. 14 and Dec. 28 to 31 estimated by means of climatologic records and the discharge from adjacent drainage basins. Mean discharge Apr. 1 to 14 estimated 800 second-feet.

KENDUSKEAG STREAM NEAR BANGOR, MAINE.

Location.—At highway bridge at Sixmile Falls, about 6 miles northwest of Bangor.
Records available.—September 15, 1908, to December 31, 1911. Data also in annual reports of Maine State Water Storage Commission.
Drainage area.—191 square miles.
Gage.—Standard chain; datum unchanged.
Channel.—Permanent; broken by one pier; banks high and not subject to overflow.
Discharge measurements.—Made from the bridge.
Winter flow.—Affected by ice.

Artificial control.—A number of years ago an artificial cut was made for log driving through a low divide between Souadabscook Stream and Black Stream, the latter a tributary to the Kenduskeag, entering about 7 miles above the gaging station. During high stages of the Souadabscook a portion of its waters finds its way through the artificial cut into Kenduskeag; at low stages of the Souadabscook all the flow continues down its own channel. Black Stream probably sends its water only to the Kenduskeag.

Accuracy.—A good discharge rating curve has been developed, although more measurements are needed at high stages.

Cooperation.—Station maintained in cooperation with Mr. Fred Cort, of Bangor, Maine.

Discharge measurements of Kenduskeag Stream near Bangor, Maine, in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
1911.		*Feet.*	*Sec.-ft.*
July 21	F. E. Pressey	1.52	18
Oct. 7	do	2.11	87
Nov. 6	do	1.88	60
6	do	1.88	62

Daily gage height, in feet, of Kenduskeag Stream near Bangor, Maine, for 1911.

[Fred Cort, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.35	.....	.....	5.1	4.3	1.95	2.05	2.45	2.2	2.2	2.2	3.8
2	3.6	.....	.....	5.25	4.2	1.85	2.0	2.5	2.2	2.15	2.1	3.8
3	3.75	.....	.....	5.45	4.05	1.85	1.9	2.35	2.3	2.2	2.0	3.7
4	3.95	3.25	.....	5.55	3.9	1.85	1.85	2.2	2.3	2.2	1.95	3.65
5	4.15	.....	3.25	5.45	3.85	1.95	1.85	2.15	2.4	2.2	1.9	3.55
6	4.25	.....	.....	5.65	3.85	2.0	1.75	2.0	2.3	2.1	1.9	3.5
7	4.25	.....	.....	5.65	3.95	2.15	1.75	2.1	2.2	2.1	2.0	3.6
8	4.35	.....	.....	6.45	3.85	2.05	1.9	2.1	2.1	2.1	2.1	3.45
9	4.15	.....	.....	7.25	3.75	2.05	1.95	2.2	2.0	2.2	2.25	3.25
10	4.05	.....	.....	7.5	3.75	2.05	2.05	2.2	2.0	2.2	2.3	3.0
11	4.05	.....	.....	7.4	3.75	2.05	2.05	2.3	1.9	2.2	2.3	3.3
12	4.0	3.65	3.15	7.5	3.6	2.15	2.05	2.2	1.9	2.2	2.3	3.55
13	3.95	.....	.....	7.05	3.4	2.25	2.0	2.1	1.9	2.15	2.45	3.8
14	3.95	.....	.....	6.15	3.2	2.55	1.9	2.05	1.8	2.1	2.55	3.75
15	3.85	.....	.....	6.95	3.0	2.75	1.85	2.0	1.9	2.2	2.85	3.6
16	.....	.....	.....	7.3	2.8	3.1	1.85	1.9	1.8	2.2	3.05	3.5
17	.....	.....	.....	6.95	2.4	3.25	1.75	1.8	1.8	2.2	3.15	3.4
18	.....	.....	.....	6.55	2.2	3.1	1.75	1.7	1.85	2.2	3.2	3.75
19	.....	2.95	4.05	5.95	2.15	2.7	1.65	1.7	1.9	2.2	3.1	4.05
20	.....	.....	.....	5.55	2.15	2.4	1.55	1.8	2.0	2.2	3.2	4.4
21	.....	.....	.....	5.5	2.15	2.4	1.5	1.9	2.0	2.2	3.1	4.75
22	.....	.....	.....	5.4	2.15	2.3	1.6	2.05	2.0	2.2	3.0	4.7
23	.....	.....	.....	5.3	2.25	2.25	1.85	2.2	2.0	2.45	3.15	5.6
24	.....	.....	.....	5.15	2.1	2.25	2.0	2.2	2.0	2.55	3.3	6.25
25	.....	.....	.....	4.8	2.05	2.25	2.0	2.15	1.95	2.85	3.3	6.0
26	.....	2.85	4.6	4.65	1.95	2.1	2.0	2.0	2.1	2.85	3.25	5.9
27	.....	.....	4.75	4.5	1.85	1.9	2.1	2.0	2.2	2.7	3.4	5.65
28	.....	.....	5.0	4.25	1.85	1.9	2.2	2.05	2.2	2.45	3.65	5.5
29	.....	.....	5.05	4.3	1.95	1.95	2.25	2.1	2.2	2.25	3.7	5.25
30	.....	.....	4.95	4.35	1.95	2.05	2.3	2.1	2.2	2.15	3.8	5.2
31	.....	.....	5.0	.....	1.95	.....	2.35	2.1	.....	2.2	.....	5.15

NOTE.—Relation of gage height to discharge affected by ice from about Jan. 16 to about Mar. 25. Probably not affected by backwater from ice at any other time during the year. The gage readings were taken to the water surface.

Daily discharge, in second-feet, of Kenduskeag Stream near Bangor, Maine, for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	382	.....	.....	1,200	745	64	78	146	102	102	102	538
2	465	.....	.....	1,300	700	51	71	156	102	94	86	538
3	520	.....	.....	1,440	635	51	57	128	119	102	71	501
4	596	.....	.....	1,520	576	51	51	102	119	102	64	483
5	678	.....	.....	1,440	557	64	51	94	137	102	57	448
6	722	.....	.....	1,590	557	71	40	71	119	86	57	431
7	722	.....	.....	1,590	596	94	40	86	102	86	71	465
8	770	.....	.....	2,210	557	78	57	86	86	86	86	414
9	678	.....	.....	2,900	520	78	64	102	71	102	110	350
10	635	.....	.....	3,120	520	78	78	102	71	102	119	276
11	635	.....	.....	3,030	520	78	78	119	57	102	119	366
12	615	.....	.....	3,120	465	94	78	102	57	102	119	448
13	596	.....	.....	2,720	398	110	71	86	57	94	146	538
14	596	.....	.....	1,970	335	166	57	78	45	86	166	520
15	557	.....	.....	2,630	276	211	51	71	57	102	236	465
16	.....	.....	.....	2,940	223	305	51	57	45	102	290	431
17	.....	.....	.....	2,630	137	350	40	45	45	102	320	398
18	.....	.....	.....	2,290	102	305	40	34	51	102	335	520
19	.....	.....	.....	1,810	94	199	30	34	57	102	305	635
20	.....	.....	.....	1,520	94	137	22	45	71	102	335	795
21	.....	.....	.....	1,480	94	137	18	57	71	102	305	985
22	.....	.....	.....	1,410	94	119	25	78	71	102	276	955
23	.....	.....	.....	1,340	110	110	51	102	71	146	320	1,550
24	.....	.....	.....	1,240	86	110	71	102	71	166	366	2,050
25	.....	.....	.....	1,020	78	110	71	94	64	236	366	1,850
26	.....	.....	900	928	64	86	71	71	86	236	350	1,775
27	.....	.....	985	845	51	57	86	71	102	199	398	1,590
28	.....	.....	1,140	722	51	57	102	78	102	146	483	1,480
29	.....	.....	1,170	745	64	64	110	86	102	110	501	1,300
30	.....	.....	1,110	770	64	78	119	86	102	94	538	1,270
31	.....	.....	1,140	.....	64	.....	128	86	.....	102	.....	1,240

NOTE.—Daily discharge determined from a discharge rating curve well defined below 1,800 second-feet.

Monthly discharge of Kenduskeag Stream near Bangor, Maine, for 1911.

[Drainage area, 191 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	.....	.....	457	2.39	2.76	D.
February	.....	.....	173	.906	.94	D.
March	1,170	.....	485	2.54	2.93	D.
April	3,120	722	1,780	9.32	10.40	A.
May	745	51	304	1.59	1.83	A.
June	350	51	119	.623	.70	A.
July	128	18	63.1	.330	.38	A.
August	156	34	85.6	.448	.52	A.
September	137	45	80.4	.421	.47	A.
October	236	86	116	.607	.70	A.
November	538	57	237	1.24	1.38	A.
December	2,050	276	826	4.32	4.98	A.
The year	3,120	18	394	2.06	27.99	

NOTE.—Discharge for Jan. 16 to Mar. 25 estimated from climatologic records.
Mean discharge Jan. 16 to 31 estimated 313 second-feet, ranging from about 500 second-feet to about 150 second-feet.
Mean discharge Mar. 1 to 25 estimated 344 second-feet, ranging from about 150 to 800 second-feet.
The discharge during February ranged from about 400 second-feet to about 100 second-feet.

KENNEBEC RIVER BASIN.

MOOSE RIVER NEAR ROCKWOOD, MAINE.

Location.—At a deserted cabin one-fourth mile above the house of Edilbert Arsenault, 2 miles above the mouth of the river; reached by steamer or rowboat from Kineo.

Records available.—September 7, 1902, to December 31, 1908, and May 16, 1910, to December 31, 1911. Data also in annual reports of Maine State Water Storage Commission.

Drainage area.—680 square miles.

Gage.—Standard chain; datum unchanged.

Channel.—Permanent.

Discharge measurements.—Made from a car suspended from a steel cable or, at low stages, by wading a short distance down stream.

Winter flow.—Affected by ice.

Artificial control.—Dams are maintained at the outlets of several of the lakes above the station, but all such stored water is used for log driving and the effect upon the regimen of flow is but temporary.

Accuracy.—The relation between gage height and discharge is at times affected by backwater from log jams, and during the winter by ice; otherwise conditions favor accurate determination of discharge and a good discharge rating curve has been developed except for extremely low stages.

Cooperation.—Station maintained in cooperation with the Maine State Water Storage Commission.

Daily gage height, in feet, of Moose River near Rockwood, Maine, for 1911.

[Edilbert Arsenault, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.4	2.8	2.0	1.8	7.05	3.95	3.25	2.35	2.65	3.4	3.1	3.0
2	2.4	3.0	2.0	1.8	7.95	3.9	3.3	2.4	2.55	3.4	3.1	3.0
3	2.4	3.3	1.9	1.8	8.1	3.8	3.3	2.35	2.55	3.4	3.2	3.0
4	2.5	3.0	1.9	1.8	8.15	3.75	3.4	2.3	2.55	3.45	3.2	3.0
5	2.5	2.8	.....	1.9	8.05	3.6	3.4	2.25	2.65	3.5	3.2	3.1
6	2.5	2.8	.....	2.0	7.85	3.6	3.35	2.2	2.8	3.5	3.1	3.2
7	2.6	2.8	.....	2.0	7.7	3.7	3.3	2.2	2.8	3.5	3.05	3.2
8	2.5	2.6	.....	1.9	7.9	3.5	3.3	2.2	2.95	3.5	3.0	3.2
9	2.5	2.6	1.8	1.9	8.05	3.45	3.3	2.2	3.0	3.4	3.0	3.2
10	2.4	2.5	1.8	1.9	7.85	3.4	3.25	2.2	3.0	3.3	3.05	3.1
11	2.4	2.4	1.8	2.0	7.65	3.4	3.2	2.25	3.0	3.25	3.1	3.1
12	2.4	2.4	1.9	2.1	7.15	3.3	3.2	2.45	3.0	3.2	3.1	3.1
13	2.4	2.3	1.9	2.2	6.8	3.35	3.3	2.6	3.0	3.15	3.0	3.1
14	2.4	2.3	1.9	2.2	6.55	3.4	3.4	2.7	3.0	3.1	3.0	3.3
15	2.5	2.2	1.9	2.4	6.45	3.45	3.45	2.75	3.0	3.0	3.15	4.0
16	2.5	2.2	2.0	2.5	6.2	3.3	3.35	2.75	3.0	3.0	3.3	4.2
17	2.5	2.2	2.2	2.7	5.6	3.4	3.1	2.85	2.9	3.0	3.35	4.2
18	2.5	2.2	2.2	2.7	5.25	3.45	3.05	2.9	2.9	3.0	3.4	4.2
19	2.5	2.2	2.0	2.9	4.95	3.5	3.0	3.0	2.9	3.0	3.3	4.3
20	2.5	2.2	2.0	3.2	4.85	3.6	2.9	3.0	2.85	3.05	3.25	4.4
21	2.5	2.1	1.8	3.5	4.65	3.6	2.9	2.95	2.8	3.1	3.2	4.3
22	2.5	2.1	1.9	3.5	4.5	3.6	2.8	2.85	2.8	3.1	3.1	4.3
23	2.4	2.1	1.9	3.65	4.35	3.4	2.7	2.8	2.8	3.1	3.1	4.3
24	2.3	2.0	1.9	3.85	4.1	3.3	2.6	2.75	2.8	3.3	3.1	4.3
25	2.2	2.0	1.9	4.05	4.0	3.3	2.5	2.7	2.85	3.3	3.0	4.3
26	2.2	2.0	1.8	4.25	3.9	3.25	2.4	2.7	2.9	3.4	2.9	4.3
27	2.2	2.0	1.8	4.55	3.9	3.15	2.3	2.65	3.0	3.4	2.9	4.2
28	2.2	2.0	1.8	5.35	4.0	3.2	2.1	2.6	3.0	3.3	2.9	4.1
29	2.2	.....	1.8	6.0	4.05	3.25	2.45	2.55	3.05	3.3	2.9	4.05
30	2.2	.....	1.8	6.6	4.15	3.35	2.45	2.5	3.1	3.2	3.0	4.0
31	2.2	.....	1.8	.....	4.05	.....	2.35	2.7	.....	3.2	.....	3.9

NOTE.—The relation of gage height to discharge was probably affected by ice from about Jan. 1 to about Mar. 31. Probably not affected by backwater from ice during December. It is not known whether the gage readings during the first three months were taken to water surface or to the top of the ice.

Daily discharge, in second-feet, of Moose River near Rockwood, Maine, for 1911.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	177	4,170	1,200	760	356	475	846	681	631
2	177	5,220	1,170	788	375	434	846	681	631
3	177	5,400	1,100	788	356	434	846	733	631
4	177	5,460	1,060	846	338	434	876	733	631
5	207	5,340	968	846	320	475	906	733	681
6	238	5,100	968	817	303	539	906	681	733
7	238	4,920	1,030	788	303	539	906	656	733
8	207	5,160	906	788	303	608	906	631	733
9	207	5,340	876	788	303	631	846	631	733
10	207	5,100	846	760	303	631	788	656	681
11	238	4,860	846	733	320	631	760	681	681
12	270	4,280	788	733	394	631	733	681	681
13	303	3,890	817	788	454	631	707	631	681
14	303	3,620	846	846	496	631	681	631	788
15	375	3,510	876	876	518	631	631	707	1,240
16	414	3,240	788	817	518	631	631	788	1,380
17	496	2,630	846	681	562	584	631	817	1,380
18	496	2,290	876	656	584	584	631	846	1,380
19	584	2,010	906	631	631	584	631	788	1,460
20	733	1,920	968	584	631	562	656	760	1,540
21	906	1,750	968	584	608	539	681	733	1,460
22	906	1,620	968	539	562	539	681	681	1,460
23	1,000	1,500	846	496	539	539	681	681	1,460
24	1,130	1,310	788	454	518	539	788	681	1,460
25	1,270	1,240	788	414	496	562	788	631	1,460
26	1,420	1,170	760	375	496	584	846	584	1,460
27	1,660	1,170	707	338	475	631	846	584	1,380
28	2,380	1,240	733	270	454	631	788	584	1,310
29	3,040	1,270	760	394	434	656	788	584	1,270
30	3,670	1,340	817	394	414	681	733	631	1,240
31	.....	1,270	.....	356	496	.....	733	.....	1,170

NOTE.—Daily discharge determined from a well-defined discharge rating curve. Discharge during the first part of April may have been slightly affected by ice.

Monthly discharge of Moose River near Rockwood, Maine, for 1911.

[Drainage area, 680 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	.....	.....	180	0.265	0.31	D.
February	.....	.....	130	.191	.20	D.
March	.....	.....	140	.206	.24	D.
April	3,670	177	787	1.16	1.29	B.
May	5,460	1,170	3,170	4.66	5.37	A.
June	1,200	707	894	1.31	1.46	A.
July	876	270	643	.946	1.09	A.
August	631	303	447	.657	.76	A.
September	681	434	573	.843	.94	A.
October	906	631	765	1.12	1.29	A.
November	846	584	684	1.01	1.13	A.
December	1,540	631	1,070	1.57	1.81	B.
The year	5,460	.....	796	1.17	15.89	

NOTE.—Discharge for Jan. 1 to Mar. 31 estimated from climatologic records.

MOOSEHEAD LAKE AT EAST OUTLET, MAINE.

Location.—At the wharf at the east outlet of the lake, about 8 miles from Kineo.

Records available.—April 1, 1895, to December 31, 1911.

Drainage area.—1,240 square miles.

Gage.—Staff, at end of boat landing; two datums have been used at the east outlet; the original datum is at elevation 1,011.30 feet above mean sea level and approximately 10 feet below the sills of the outlet gates; the second, to which all gage readings have been referred, is 10 feet higher; that is, the zero is at the sill of the gates.

Artificial control.—The lake is regulated to a capacity of 23,735,000,000 cubic feet. The dam at the east outlet is controlled by 35 gates; 15 old gates are at gage height, 10 feet (original datum), and 20 gates at sill-gate height, 8 feet (original datum). At extreme low stages the flow from the lake is controlled not by the gates but by a bar above the dam at an approximate gage height of 9 feet (original datum). The records show only fluctuations in the level of the lake, and are used in the studies of regulation of the lake and in computing the natural flow of the Kennebec at The Forks station.

Cooperation.—Record kept and furnished for publication by the Hollingsworth & Whitney Co.

Daily gage height, in feet, of Moosehead Lake at east outlet, Maine, for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		0.65	0.2						2.25		1.75	2.2
2	1.15				1.8	5.25		3.4		1.6		
3		.6	.15		2.5		4.5				1.8	
4	1.05			0.1				3.25	2.15	1.55		2.3
5				.1	3.0	5.3	4.5					
6	1.0	.6	.15						2.1	1.5	1.8	2.4
7						5.25	4.4	3.1				
8		.55	.1	.2	3.7				2.1		1.75	2.5
9	.9					5.1		3.0		1.6		
10		.5	.1	.2	4.1		4.2				1.8	
11	.9					5.1		2.85	2.05	1.6		2.6
12				.25	4.8		4.1					
13	.9	.45	.05						2.0	1.55	1.8	2.75
14				.3		4.9	4.2	2.75				
15		.45	.05		4.9		4.1		1.95		1.9	2.8
16	.8					4.85		2.65		1.6		
17		.4	.05	.3	5.0		4.0				1.9	
18	.75							2.6	1.9	1.55		3.1
19				.35	5.1	4.9	3.95					3.2
20	.75	.4	.0			4.85			1.8	1.6	2.2	
21				.4			3.8	2.5			2.2	3.3
22		.35	.0		5.1	4.85			1.8			
23	.75						3.7	2.5		1.7		3.35
24		.3	.0	.7	5.15						2.2	
25	.7							2.4	1.75	1.8		3.65
26				.8	5.2	4.7	3.55					
27	.7	.3	.0						1.7	1.8	2.2	3.7
28				1.1		4.65	3.45	2.3				
29			.0						1.65		2.2	3.8
30	.6					4.6		2.3		1.8		
31			.1		5.2		3.45					

NOTE.—The storage capacity of Moosehead Lake is approximately equal to a discharge of 120 second-feet for one month for each tenth foot of depth over the lake surface.

KENNEBEC RIVER AT THE FORKS, MAINE.

Location.—At wooden highway bridge across river about 2,000 feet above the mouth of Dead River.

Records available.—September 28, 1901, to December 31, 1911. Data also in annual reports of Maine State Water Storage Commission.

Drainage area.—1,570 square miles.

Gages.—Standard chain, attached to the bridge, and a staff gage attached to timber retaining wall on left bank 75 feet above the bridge; datum of gages unchanged. Automatic gage to be installed.

Channel.—Permanent; unbroken by piers.

Discharge measurements.—Made from the bridge.

Winter flow.—Affected by ice.

Artificial control.—The flow of the Kennebec above The Forks is controlled through Moosehead Lake (q. v.); Indian Pond, about 12 miles above the station, is under regulation for log driving from about May 1 to July 31 of each year.

Accuracy.—The relation between gage height and discharge is affected by the regulation of the stream for log driving and for the extensive water power plants below and, during the winter, by ice. The operation of the gates at Indian Pond dam (from about May 1 to July 31 of each year) causes fluctuations in daily gage heights at The Forks ranging from 2 feet to more than 5 feet. A good rating curve has been developed for the station, as the variations in gage heights have been closely noted, record being kept of the maximum and minimum heights for each day during the log-driving season, the length of time that the driving head continues, and the hours at which the gates at Indian Pond are opened and closed each day.

Cooperation.—Station maintained in cooperation with the Maine State Water Storage Commission.

Daily gage height, in feet, of Kennebec River at The Forks, Maine, for 1911.

[W. S. Young, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Sept.	Oct.	Nov.	Dec.
1	.....	.....	2.5	1.0	4.9	.....	.....	2.0	1.65	1.2
2	.....	.....	.....	0.8	5.0	.....	.....	2.0	1.45	1.3
3	.....	.....	.....	.7	4.5	.....	.....	2.0	1.0	1.4
4	2.0	.....	.....	.7	3.6	.....	.....	2.0	.85	1.5
5	2.0	.....	.....	.7	3.1	.....	.....	2.0	.6	.....
6	2.0	.....	2.5	.6	2.6	.....	.....	2.0	.5	1.6
7	2.1	.....	.....	.5	2.2	.....	.....	2.0	.55	1.5
8	2.1	2.5	.....	.5	2.15	.....	.....	2.0	.6	1.4
9	2.25	.....	.....	.....	2.0	.....	.....	2.0	.65	1.4
10	2.05	.....	.....	.....	1.95	.....	.....	1.2	.7	1.4
11	2.05	.....	.....	.....	1.8	.....	.....	1.2	.8	1.3
12	2.1	.....	2.4	.....	1.65	.....	.....	1.25	.8	1.3
13	2.05	.....	.....	.....	1.15	.....	.....	1.4	.8	1.3
14	2.0	.....	.....	.....	1.2	.....	.....	1.55	.7	1.6
15	2.0	.....	.....	.....	1.25	.....	2.5	1.7	.7	1.9
16	2.05	.....	.....	.....	1.35	.....	2.35	1.6	.7	1.7
17	2.2	.....	2.4	.....	.....	.....	2.2	1.6	.7	1.6
18	2.3	.....	.....	.....	.....	.....	2.15	1.65	.8	1.5
19	2.3	.....	.....	.....	.....	.....	2.1	1.9	.8	1.5
20	2.3	.....	.....	.....	.....	.....	2.05	1.8	.8	1.5
21	2.4	.....	.....	.....	.....	.....	2.0	1.65	.8	1.5
22	.....	.....	.....	.....	.....	.....	2.0	1.65	.9	1.5
23	.....	.....	2.4	1.6	.....	.....	2.0	1.15	.9	1.5
24	.....	.....	.....	1.6	.....	.....	2.0	1.4	.9	1.6
25	.....	2.0	.....	1.6	.....	.....	2.0	.5	.9	1.6
26	.....	.....	.....	1.8	.....	.....	2.2	.4	.9	1.6
27	.....	.....	.....	2.3	.....	.....	2.15	.35	.9	1.6
28	2.6	.....	.....	3.0	.....	.....	2.05	.9	.9	1.6
29	.....	.....	.....	3.8	.....	.....	2.0	1.45	1.0	1.6
30	.....	.....	2.4	4.4	.....	.....	2.0	1.85	1.2	1.6
31	.....	.....	1.5	.....	.....	.....	.....	1.7	.....	1.6

NOTE.—Relation of gage height to discharge affected by ice from about Jan. 1 to about Apr. 8. The ice probably went out about Apr. 15. There was probably no material effect from ice during December. The observer states that there was ice clear across on Dec. 4, and that the ice went out Dec. 6. The gage readings for Jan. 21 to Apr. 8, and Dec. 4 are probably all to the top of the ice. Gage heights Jan. 4 to 20 are probably to water surface. Gage heights from May 17 to Sept. 14 are not true indices of the discharge, owing to the effect of regulation, for the purpose of log driving, and hence they are omitted.

Daily discharge, in second-feet, of Kennebec River at The Forks, Maine, for 1911.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	5,660	6,320	2,660	2,620	2,060	1,330	1,030	700
2	.....	5,870	6,680	2,550	2,570	2,060	1,330	878	770
3	.....	4,880	6,830	2,660	2,620	2,060	1,330	570	840
4	.....	3,320	3,070	2,600	2,620	2,060	1,330	480	915
5	.....	2,600	3,000	2,600	2,570	2,060	1,330	345	952
6	.....	1,960	3,000	2,600	2,570	2,060	1,330	300	990
7	.....	1,530	2,880	2,660	2,520	2,060	1,330	322	915
8	.....	1,480	2,940	2,600	2,520	2,010	1,330	345	840
9	.....	1,330	2,940	2,600	2,470	2,100	1,330	370	840
10	.....	1,280	2,880	2,550	2,470	2,060	700	395	840
11	.....	1,160	3,000	735	2,420	2,060	700	450	770
12	.....	1,030	2,940	700	2,420	2,010	735	450	770
13	.....	668	2,880	700	2,480	2,010	840	450	770
14	.....	700	2,940	940	2,530	2,010	952	395	990
15	.....	735	2,510	2,500	2,530	1,850	1,070	395	1,240
16	.....	805	2,510	2,500	2,580	1,680	990	395	1,070
17	.....	2,100	2,370	2,500	2,420	1,530	990	395	990
18	.....	2,800	2,370	2,500	2,320	1,480	1,030	450	915
19	.....	2,360	2,370	2,500	2,060	1,430	1,240	450	915
20	.....	2,240	2,370	2,500	2,060	1,380	1,160	450	915
21	.....	4,780	2,430	2,500	2,110	1,330	1,030	450	915
22	.....	5,420	2,370	2,500	2,000	1,330	1,030	510	915
23	990	3,570	2,410	2,500	2,000	1,330	668	510	915
24	990	3,140	2,370	2,500	1,950	1,330	840	510	990
25	990	3,020	2,370	2,560	1,850	1,330	300	510	990
26	1,160	2,850	2,370	2,560	1,850	1,530	255	510	990
27	1,630	2,850	2,370	2,560	1,830	1,480	235	510	990
28	2,460	3,080	2,410	2,610	1,850	1,380	510	510	990
29	3,640	1,330	2,470	2,610	2,060	1,330	878	570	990
30	4,690	2,940	2,500	2,620	2,060	1,330	1,200	700	990
31	.....	3,030	.....	2,680	2,060	.....	1,070	.....	990

NOTE.—Daily discharge determined from a well-defined discharge rating curve. The determinations for May 17 to Sept. 14 are approximate, however, as a result of possible errors in computed discharge caused by controlled flow for flushing logs down the river and backwater from log jams. The daily discharge for this period was computed by applying the rating table to the several gage readings taken during any given day, and weighting the values in accordance with the proportional part of the day to which each gage height is applicable. No correction was made for possible effect of backwater from ice during December.

Monthly discharge of Kennebec River at The Forks, Maine, for 1911.

[Drainage area, 1,570 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	.....	.....	1,280	0.815	0.94	D.
February	.....	.....	900	.573	.60	D.
March	.....	.....	760	.484	.56	D.
April	4,690	.....	905	.576	.64	C.
May	5,870	668	2,600	1.66	1.91	B.
June	6,830	2,370	3,030	1.93	2.15	B.
July	2,680	700	2,330	1.48	1.71	B.
August	2,620	1,830	2,290	1.46	1.68	B.
September	2,100	1,330	1,720	1.09	1.22	B.
October	1,330	235	980	.624	.72	A.
November	1,030	300	487	.310	.35	A.
December	1,240	700	923	.588	.68	A.
The year	6,830	235	1,520	.968	13.16	

NOTE.—The relatively low accuracy for May to September is due to complications caused by controlled flow and log driving.

The discharge from Jan. 1 to Apr. 22 determined primarily from the discharge at Waterville, taking into consideration, however, the effect of storage at Moosehead Lake.

Discharge Apr. 1 to 22, estimated, 482 second-feet, ranging from about 300 second-feet to about 900 second-feet. The discharge from Jan. 1 to Mar. 31 probably followed a law of gradual decrease with no rises due to freshets.

KENNEBEC RIVER AT WATERVILLE, MAINE.

Location.—At the dam and mill of the Hollingsworth & Whitney Co. at Waterville, 2 miles above the mouth of Sebasticook River and about 3½ miles above the mouth of Messalonskee Stream.

Records available.—March 22, 1892, to December 31, 1911. Data also in annual reports Maine State Water Storage Commission.

Drainage area.—4,270 square miles.

Gage.—Rod gages in the pond above the dam and in the tailrace of the mill.

Determination of discharge.—The discharge is computed from the flow over the dam, through the logway, and through 18 wheels of the mill. Most of the wheels were rated at Holyoke, Mass., under practically the same head as that used at Waterville—about 23 feet. Methods and diagrams for estimating the flow have been developed by the company, and the amount lost by leakage and used for washing and various purposes in the mill is estimated. When the flow of the river is less than about 3,500 second-feet all the water is used through the wheels.

Winter flow.—As a rule, not affected by ice. During most years the winter flow passes through the wheels of the mill.

Artificial control.—Numerous power plants and storage above the station.

Accuracy.—Results are considered fair only, as many wheels are in operation and only one reading a day is made for each wheel, but the record is valuable because of its length and continuity.

Cooperation.—Records are obtained and furnished by the Hollingsworth & Whitney Co.; computations are made in the office of the district engineer.

Daily discharge, in second-feet, of Kennebec River at Waterville, Maine, for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	a 624	906	1,490	4,330	23,700	3,320	3,420	4,020	3,420	a 408	3,000	5,150
2	2,500	1,700	1,470	a 4,020	23,800	3,740	a2,770	3,620	3,190	3,710	3,040	4,420
3	1,620	1,470	1,080	5,120	24,400	6,540	1,860	3,720	a1,100	3,360	2,780	a 2,770
4	2,860	1,430	1,690	3,860	20,200	a 5,620	1,350	3,680	3,640	2,890	2,540	3,380
5	3,000	a 995	a 285	3,790	14,700	6,000	3,980	3,480	2,670	2,880	a 248	2,960
6	3,000	1,500	1,330	2,740	9,220	5,120	3,080	a1,480	3,510	3,770	2,780	2,960
7	2,720	1,640	1,370	3,500	a 6,750	4,570	3,460	3,330	3,410	3,440	2,910	2,540
8	a1,500	1,740	1,310	6,300	5,440	3,380	3,220	3,140	3,000	a1,460	2,470	2,890
9	2,950	1,700	1,380	a 7,700	5,670	3,860	a1,150	3,260	3,310	2,440	4,540	4,310
10	2,470	1,680	1,380	7,170	7,780	3,790	3,780	3,530	a 737	2,980	3,610	a 1,540
11	2,120	1,660	1,260	7,550	4,610	a 1,910	3,530	3,460	3,390	2,930	3,060	2,910
12	2,390	a 237	a 363	11,100	5,880	4,180	3,180	3,330	2,690	2,570	a 635	3,290
13	2,480	1,530	1,500	11,700	4,100	4,190	2,940	a 667	2,780	2,250	3,000	3,640
14	2,460	1,700	623	15,000	a 4,120	4,190	1,490	3,450	3,440	1,660	3,520	5,280
15	a 369	1,800	1,470	17,900	4,680	5,020	901	3,190	3,440	a 621	4,230	9,820
16	2,010	1,810	1,310	a27,900	4,660	5,890	a 744	3,510	3,080	1,480	4,020	7,600
17	2,440	1,280	1,430	20,500	6,380	6,590	3,220	3,410	a 890	2,130	3,690	a 4,740
18	2,450	1,370	1,360	17,800	4,900	a 5,210	2,890	3,590	2,340	2,230	3,040	5,540
19	2,040	a 206	a 347	16,600	4,900	6,050	3,090	4,180	2,840	2,560	a1,050	6,420
20	2,190	1,470	648	14,100	5,930	4,160	3,170	a1,390	2,830	2,960	3,400	5,620
21	2,000	1,720	1,380	13,400	a 3,800	4,330	3,200	4,050	2,410	3,190	3,700	3,540
22	a 207	1,440	1,410	12,800	4,730	4,170	3,370	4,080	2,490	a1,570	2,850	3,260
23	2,400	1,730	1,440	a11,300	4,770	3,990	a 843	3,360	2,540	3,730	2,950	3,530
24	2,380	1,400	1,300	5,540	4,940	3,720	3,410	4,360	a 392	3,990	2,460	a 5,950
25	2,120	1,390	1,430	9,200	4,500	a 1,360	4,250	3,740	2,540	3,810	2,990	9,030
26	1,540	a 278	a1,190	12,100	5,370	3,960	3,240	3,530	3,520	3,620	a1,840	7,040
27	1,600	1,380	1,410	16,000	4,870	3,280	3,580	a1,400	3,610	2,780	3,140	6,390
28	1,280	1,360	2,280	19,700	a 3,240	3,360	3,660	3,560	4,290	2,910	2,950	5,900
29	a 565	.....	2,360	25,500	4,820	3,390	4,360	2,450	3,770	a1,410	3,730	3,970
30	2,230	.....	3,190	a27,200	3,690	3,260	a1,890	3,390	2,610	2,800	3,640	3,670
31	2,080	.....	3,270	.....	4,810	.....	5,230	3,310	.....	2,920	.....	a 445

a Sunday.

Monthly discharge of Kennebec River at Waterville, Maine, for 1911.

[Drainage area, 4,270 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	3,000	207	2,020	0.473	0.55
February	1,810	206	1,380	.323	.34
March	3,270	285	1,410	.330	.38
April	27,900	2,740	12,000	2.81	3.14
May	24,400	3,240	7,790	1.82	2.10
June	6,590	1,360	4,270	1.00	1.12
July	5,230	744	2,910	.681	.79
August	4,360	667	3,250	.761	.88
September	4,290	392	2,800	.656	.73
October	3,990	408	2,630	.616	.71
November	4,540	248	2,930	.686	.77
December	9,820	445	4,530	1.06	1.22
The year	27,900	206	4,000	.937	12.73

DEAD RIVER NEAR THE FORKS, MAINE.

Location.—One-eighth mile above farmhouse of Jeremiah Durgin, 1½ miles west of The Forks.

Records available.—September 29, 1901, to August 15, 1907, and from March 16, 1910, to December 31, 1911. Data also in annual reports of Maine State Water Storage Commission.

Drainage area.—878 square miles.

Gage.—Inclined staff, bolted to large bowlder on the left bank, a short distance from observer's house; datum unchanged.

Channel.—Permanent; banks medium high; overflowed only at extreme high water.

Discharge measurements.—Made from a car suspended from a cable a short distance above the gage.

Winter flow.—Affected by ice.

Artificial control.—A number of dams on the lakes above, used solely for log driving.

Accuracy.—Relation between gage height and discharge is affected by ice during the winter and by the control of the stream for log driving during May and June. Special note is made of the length and times of the drive and of the maximum and minimum head used.

Cooperation.—Station maintained in cooperation with the Maine State Water Storage Commission.

Discharge measurements of Dead River near The Forks, Maine, in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.ft.*
Aug. 1	F. E. Pressey	1.23	653
17	do	1.19	583
18	do	1.26	712
21	do	1.31	748
Oct. 25	do	1.53	1,000
26	do	1.47	981

Daily gage height, in feet, of Dead River near The Forks, Maine, for 1911.

[Jeremiah Durgin, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.55	0.7	.....	.....	5.25	1.95	1.3	1.2	1.1	1.25	1.05	1.75
2	1.4	.7	.....	.....	5.4	.....	1.2	1.2	1.1	1.35	1.35	1.8
3	1.35	.7	.....	.....	5.25	1.7	1.2	1.1	1.1	1.45	1.25	1.65
4	1.3	.8	.....	.....	4.95	.....	1.1	1.1	1.1	1.7	1.2	1.4
5	1.3	.8	.....	.....	4.7	1.9	1.1	1.1	1.1	1.45	1.1	1.3
6	1.3	.8	.....	.....	4.75	.....	1.0	0.95	1.1	1.4	1.1	1.3
7	1.3	.8	.....	.....	3.95	1.75	1.0	.9	1.2	1.35	1.1	1.3
8	1.2	.8	.....	.....	4.4	.....	1.0	.85	1.2	1.3	1.2	1.2
9	1.1	.8	.....	.....	4.5	1.75	1.0	.8	1.2	1.25	1.3	1.2
10	1.1	.8	.....	.....	.....	.....	1.0	.8	1.1	1.2	1.3	1.2
11	1.1	.8	.....	.....	3.5	.....	1.0	.8	1.1	1.1	1.3	1.2
12	1.1	.....	.....	.....	3.25	.....	.9	.8	1.1	1.1	1.3	1.3
13	1.0	.....	.....	.....	2.6	.....	.9	.8	1.1	1.15	1.25	2.05
14	1.0	.....	.....	.....	2.35	.....	.9	.8	1.0	1.2	1.2	3.05
15	1.0	.....	.....	.....	1.85	.....	.8	.8	1.0	1.3	1.2	2.85
16	1.1	.....	.....	.....	2.15	.....	.8	.9	1.0	1.2	1.5	2.5
17	1.1	.....	.....	1.8	2.0	.....	.7	1.1	1.0	1.2	1.45	2.35
18	1.1	.....	.....	1.9	2.1	1.65	.7	1.2	1.0	1.1	1.4	2.05
19	1.0	.....	.....	1.9	2.15	1.65	.7	1.3	1.0	1.25	1.4	1.85
20	1.0	.....	.....	2.0	.....	1.65	.7	1.4	1.0	1.5	1.35	1.65
21	1.0	.....	.....	2.1	.....	1.7	.7	1.3	1.0	1.55	1.3	1.55
22	1.0	.....	.....	2.2	1.8	1.8	.7	.....	1.0	1.65	1.3	1.5
23	0.9	.....	.....	2.2	1.85	1.65	.7	1.55	1.0	1.55	1.3	1.6
24	.9	.....	.....	2.35	1.85	1.55	.7	1.25	1.0	1.5	1.2	1.9
25	.9	.....	.....	2.5	1.85	1.5	1.0	1.1	1.0	1.5	1.2	2.25
26	.9	.....	.....	2.85	.....	1.4	1.1	1.05	1.1	1.45	1.2	2.05
27	.8	.....	.....	3.2	.....	1.3	1.2	1.0	1.1	1.4	1.2	2.0
28	.8	.....	.....	3.65	1.65	1.3	1.3	1.0	1.1	1.35	1.15	1.85
29	.8	.....	.....	4.1	1.95	1.15	1.3	1.0	1.2	1.3	1.2	1.65
30	.8	.....	.....	4.95	1.7	1.3	1.3	1.05	1.2	1.25	1.5	1.45
31	.75	.....	.....	.....	1.7	.....	1.2	1.1	.....	1.15	.....	1.4

NOTE.—Relation of gage height to discharge affected by ice from Jan. 1 to Apr. 16. Probably little or not at all affected by backwater from ice during December. It is not known whether the gage heights recorded for Jan. 1 to Feb. 11 were to water surface or to the top of the ice. The gage heights for May 10, 20, 21, 26 and 27, June 2, 4, 6, 8 and 10 to 17, and Aug. 22 are omitted because they are not true indices of the discharge. On these days water from the dam above was flushed down the stream to assist in driving logs.

Daily discharge, in second-feet, of Dead River near The Forks, Maine, for 1911.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	10,700	1,560	715	610	510	662	462	1,260
2	.....	11,300	1,380	610	610	510	770	770	1,330
3	.....	10,700	1,190	610	510	510	882	662	1,120
4	.....	9,510	1,340	510	510	510	1,190	610	825
5	.....	8,570	1,480	510	510	510	882	510	715
6	.....	8,760	1,370	415	370	510	825	510	715
7	.....	5,980	1,260	415	325	610	770	510	715
8	.....	7,480	1,260	415	282	610	715	610	610
9	.....	7,840	1,260	415	240	610	662	715	610
10	.....	6,260	1,240	415	240	510	610	715	610
11	.....	4,690	1,240	415	240	510	510	715	610
12	.....	4,060	1,220	325	240	510	510	715	715
13	.....	2,690	1,200	325	240	510	560	662	1,720
14	.....	2,230	1,180	325	240	415	610	610	3,600
15	.....	1,400	1,160	240	240	415	715	610	3,180
16	.....	1,880	1,140	240	325	415	610	940	2,500
17	1,330	1,640	1,140	160	510	415	610	882	2,230
18	1,480	1,800	1,120	160	610	415	510	825	1,720
19	1,480	1,880	1,120	160	715	415	662	825	1,400
20	1,640	1,700	1,120	160	825	415	940	770	1,120

Daily discharge, in second-feet, of Dead River near The Forks, Maine, for 1911—Contd.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
21	1,800	1,510	1,190	160	715	415	1,000	715	1,000
22	1,970	1,330	1,330	160	858	415	1,120	715	940
23	1,970	1,400	1,120	160	1,000	415	1,000	715	1,060
24	2,230	1,400	1,000	160	662	415	940	610	1,480
25	2,500	1,400	940	415	510	415	940	610	2,060
26	3,180	1,310	825	510	462	510	882	610	1,720
27	3,940	1,210	715	610	415	510	825	610	1,640
28	5,100	1,120	715	715	415	510	770	560	1,400
29	6,460	1,560	560	715	415	610	715	610	1,120
30	9,510	1,190	715	715	462	610	662	940	882
31	.....	1,190	.....	610	510	.....	560	.....	825

NOTE.—Daily discharge determined from a well-defined discharge rating curve. During the periods of omitted gage heights—May, June, and August—the daily discharge was computed by applying the rating table to several gage readings taken during any given day and weighting these values in accordance with the proportional part of the day to which each gage height is applicable.

Monthly discharge of Dead River near The Forks, Maine, for 1911.

[Drainage area, 878 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	.....	.....	220	0.251	0.29	D.
February	.....	.....	170	.194	.20	D.
March	.....	.....	180	.205	.24	D.
April	9,510	.....	1,690	1.93	2.15	C.
May	11,300	1,120	4,050	4.62	5.33	A.
June	1,560	560	1,140	1.30	1.45	B.
July	715	160	402	.458	.53	A.
August	1,000	240	478	.545	.63	A.
September	610	415	489	.558	.62	A.
October	1,190	510	762	.869	1.00	A.
November	940	462	677	.772	.86	A.
December	3,600	610	1,340	1.53	1.76	B.
The year	11,300	.....	972	1.11	15.06	

NOTE.—Discharge from Jan. 1 to Apr. 16 estimated from the discharge at Waterville and climatologic records. Mean discharge Apr. 1 to 16 estimated 375 second-feet, ranging from about 200 to about 800 second-feet. Discharge during each of the months January, February, and March was relatively constant.

SANDY RIVER NEAR FARMINGTON, MAINE.

Location.—At Fairbanks highway bridge, 3 miles above Farmington.

Records available.—July 11, 1910, to December 31, 1911. Data also in annual reports of Maine State Water Storage Commission.

Drainage area.—270 square miles.

Gage.—Standard chain.

Channel.—Permanent; left bank high; right bank subject to overflow in extreme freshets; current swift at high and medium stages but sluggish during low water.

Discharge measurements.—Made from the bridge.

Winter flow.—Affected by ice.

Artificial control.—No storage basins above the station; the water power dam at Phillips may slightly affect the flow at the station.

Accuracy.—A discharge rating curve has not yet been developed.

Cooperation.—Station maintained in cooperation with the Maine State Water Storage Commission.

Discharge measurements of Sandy River near Farmington, Maine, in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct 23	F. E. Pressey	4.00	609
28	do	3.20	233

Daily gage height, in feet, of Sandy River near Farmington, Maine, for 1911.

[L. A. Daggett, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1				5.4	7.1	3.85		2.9	2.6	3.5	3.0	3.7
2				4.9	6.5	3.9	2.3	2.6	2.5	3.1	3.0	3.5
3		3.6		4.7	6.0	3.3	2.4	2.6	2.5	2.9	3.0	3.3
4			3.5	4.5	4.9	3.1	2.2	2.4	2.6	3.3	2.9	3.1
5				4.2	4.6	2.9	2.2	2.3	2.6	3.8	2.9	3.8
6				4.2	4.4	2.7	2.3	2.2	2.5	3.6	2.9	4.2
7				4.2	4.7	2.8	2.2	2.2	3.5	3.2	3.0	4.0
8				4.7	4.6	2.5	2.2	2.3	2.9	3.0	4.2	3.9
9				5.5	4.9	2.6	2.1	2.8	2.6	2.9	3.8	3.5
10			3.4	5.0	4.6	2.6	2.2	2.6	2.7	2.6	3.4	3.3
11		3.5		4.7	4.6	2.6	2.1	2.3	2.5	2.8	3.3	3.5
12				4.6	3.9	3.4	2.1	2.3	2.5	2.6	3.3	3.7
13				4.2	4.1	3.85	2.2	2.4	2.5	2.6	3.4	5.9
14	3.3			5.2	3.9	3.9	2.0	2.2	2.5	2.7	3.9	5.0
15				7.5	3.6	3.6	2.0	2.2	2.5	2.6	3.5	4.2
16				6.6	3.4	3.3	2.5	2.5	2.6	2.5	3.7	3.9
17		3.5		5.6	3.4	3.4	2.4	3.9	3.6	2.5	4.0	3.8
18			3.4	5.6	3.2	3.2	2.3	3.3	2.9	2.5	4.3	3.6
19				5.3	3.2	3.0	3.0	3.2	2.7	3.75	4.6	3.5
20	3.1			5.1	3.1	3.0	2.6	3.6	2.7	4.9	3.9	3.3
21				5.0	3.1	2.8	2.4	3.1	2.5	4.6	3.2	3.5
22				4.8	2.9	2.7	2.3	2.8	2.5	3.3	3.3	3.8
23				4.6	3.1	2.6	2.4	2.6	2.9	4.0	3.7	4.0
24		3.5		4.4	2.9	2.6	2.2	2.4	2.6	4.0	3.5	5.2
25			3.7	5.4	3.2	2.5	2.1	2.4	2.6	3.6	3.3	4.3
26				6.0	3.2	2.4	2.2	2.4	3.9	3.7	3.5	4.0
27				5.9	3.3	2.5	2.2	2.4	3.6	3.6	3.5	3.8
28	3.2			6.6	2.9	2.4	2.1	2.4	3.0	3.4	3.3	3.6
29				6.9	2.9	2.4	2.55	2.6	2.9	3.1	3.5	4.0
30				6.6	2.7	2.5	3.7	3.6	3.0	3.0	4.2	4.1
31			4.7		2.7		3.1	3.1		3.0		4.1

NOTE.—The relation of gage height to discharge was doubtless affected by ice from about Jan. 1 to about Apr. 15, but not materially affected during December. The gage readings are probably to the top of the ice.

SEBASTICOOK RIVER AT PITTSFIELD, MAINE.

Location.—At steel highway bridge just above the Maine Central Railroad bridge in the town of Pittsfield.

Records available.—July 27, 1908, to December 31, 1911. Data also in annual reports of Maine State Water Storage Commission.

Drainage area.—320 square miles.

Gage.—Standard chain; datum unchanged.

Channel.—Permanent; banks high and rocky and not subject to overflow; stream confined between the abutments of the bridge.

Discharge measurements.—Made from the highway bridge.

Winter flow.—Not generally affected by ice, as the rapid fall and proximity of the power plant immediately above the station tend to keep the river open.

Artificial control.—About 800 feet upstream from the station is the dam of the Robert Dobson Co. and the Smith Woolen Co.; about one-half mile farther upstream is the dam of the Waverly Woolen Mill. About 5 miles below the station and 2 miles from Burnham is the dam of the Sebasticook Power Co., but the fall of the stream prevents backwater from the lower dam.

Accuracy.—The relation between gage height and discharge is more or less affected by fluctuations in stage caused by the operation of the dams above the station for night storage. Conditions favor the accurate determination of discharge and a fair rating curve has been developed; a few more measurements are needed to closely determine the flow at extreme high and extreme low stages.

Cooperation.—Station maintained in cooperation with Maine State Water Storage Commission.

Discharge measurements of Sebasticook River at Pittsfield, Maine, in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
July 17	F. E. Pressey	3.23	321
Oct. 4	do	3.05	236

Daily gage height, in feet, of Sebasticook River at Pittsfield, Maine, for 1911.

[Easter B. Morrill, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.3	2.8	2.45	3.1	4.7	3.05	2.85	2.95	2.75	2.65	3.1	3.2
2	2.55	2.9	2.35	3.1	4.6	3.05	2.6	2.95	2.6	2.85	2.95	3.3
3	2.45	2.85	2.35	3.1	4.45	3.05	2.65	2.8	2.5	2.8	3.0	3.3
4	2.45	2.85	2.35	3.25	4.4	3.0	2.65	2.85	2.7	2.85	3.0	3.2
5	2.45	2.5	2.25	3.3	4.45	3.05	2.9	2.65	2.7	2.85	2.95	3.2
6	2.45	2.95	2.45	3.3	3.6	2.95	3.0	2.6	2.55	2.85	2.75	3.25
7	2.35	2.95	2.55	3.5	3.75	3.05	2.95	2.95	2.7	2.6	3.15	2.9
8	2.4	2.85	2.65	4.1	4.3	3.1	2.7	2.95	2.75	2.5	3.25	2.9
9	2.65	2.9	2.85	4.1	3.95	3.05	2.6	2.7	2.5	2.75	3.15	2.9
10	2.85	2.85	2.85	3.75	3.75	2.95	2.9	2.8	2.55	2.75	3.05	3.15
11	2.95	2.85	2.9	3.7	3.65	2.6	3.0	2.85	2.85	2.8	3.05	3.4
12	3.0	2.45	2.8	3.65	3.55	2.95	2.95	2.75	2.75	2.75	2.7	3.5
13	2.95	2.9	2.85	3.6	2.95	3.0	2.9	2.65	2.75	2.7	3.05	3.7
14	2.75	2.85	2.9	4.15	2.6	2.9	2.9	2.9	2.65	2.6	3.25	3.7
15	2.55	2.8	2.95	4.3	2.9	2.9	2.65	2.9	2.85	2.2	3.25	3.7
16	2.85	2.75	2.95	4.8	3.0	3.0	2.7	2.95	2.6	2.5	3.15	3.65
17	2.85	2.65	2.9	5.3	3.05	2.85	2.9	2.9	2.5	3.0	3.1	3.6
18	2.75	2.65	2.65	5.7	3.0	2.65	2.9	2.95	2.8	2.95	2.9	3.55
19	2.7	2.45	2.4	5.85	3.0	3.0	3.0	2.65	2.9	3.0	2.8	3.6
20	2.45	2.35	2.85	5.9	2.85	3.1	2.8	2.55	2.95	2.95	3.2	3.7
21	2.45	2.35	2.85	5.9	2.7	3.05	2.8	2.9	2.85	2.85	3.2	3.7
22	2.6	2.4	2.85	5.75	2.95	3.0	2.75	2.9	2.9	2.3	3.2	3.75
23	2.95	2.4	2.9	5.5	2.95	3.05	2.5	2.9	2.7	2.6	3.1	3.9
24	2.95	2.4	2.75	5.35	2.95	2.85	3.0	2.7	2.6	2.85	3.1	4.15
25	3.0	2.4	2.7	5.35	2.95	2.65	2.85	2.8	2.9	2.95	2.95	4.3
26	2.95	2.4	2.4	5.2	2.9	3.05	2.9	2.6	2.85	3.0	2.75	4.3
27	2.9	2.4	2.45	5.0	2.9	3.05	2.85	2.55	2.8	3.05	2.85	4.3
28	2.7	2.35	2.55	4.85	2.6	3.0	2.9	2.85	2.75	2.85	3.15	4.25
29	2.5	.....	2.9	4.75	3.0	3.0	2.8	2.8	2.8	2.3	3.35	4.0
30	2.9	.....	2.9	4.6	2.8	2.9	2.8	2.85	2.65	2.95	3.25	4.1
31	2.95	.....	3.0	.....	3.0	.....	2.95	2.8	.....	2.95	.....	4.0

NOTE.—The relation of gage height to discharge is probably not affected by ice at this station, owing to the rapid fall and proximity of the power plant above the gaging station.

Daily discharge, in second-feet, of Sebasticook River at Pittsfield, Maine, for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	30	158	60	270	1,470	250	176	212	142	111	270	310
2	84	193	40	270	1,360	250	97	212	97	176	212	352
3	60	176	40	270	1,200	250	111	158	71	158	230	352
4	60	176	40	331	1,140	230	111	176	125	176	230	310
5	60	71	22	352	1,200	250	193	111	125	176	212	310
6	60	212	60	352	485	212	230	97	84	176	142	331
7	40	212	84	438	570	250	212	212	125	97	290	193
8	50	176	111	838	1,040	270	125	212	142	71	331	193
9	111	193	176	838	706	250	97	125	71	142	290	193
10	176	176	176	570	570	212	193	158	84	142	250	290
11	212	176	193	540	512	97	230	176	176	158	250	395
12	230	60	158	512	462	212	212	142	142	142	125	438
13	212	193	176	485	212	230	193	111	142	125	250	540
14	142	176	193	888	97	193	193	193	111	97	331	540
15	84	158	212	1,040	193	193	111	193	176	14	331	540
16	176	142	212	1,590	230	230	125	212	97	71	290	512
17	176	111	193	2,200	250	176	193	193	71	230	270	485
18	142	111	111	2,720	230	111	193	212	158	212	193	462
19	125	60	50	2,920	230	230	230	111	193	230	158	485
20	60	40	176	2,990	176	270	158	84	212	212	310	540
21	60	40	176	2,990	125	250	158	193	176	176	310	540
22	97	50	176	2,790	212	230	142	193	193	30	310	570
23	212	50	193	2,460	212	250	71	193	125	97	270	668
24	212	50	142	2,260	212	176	230	125	97	176	270	888
25	230	50	125	2,260	212	111	176	158	193	212	212	1,040
26	212	50	50	2,080	193	250	193	97	176	230	142	1,040
27	193	50	60	1,830	193	250	176	84	158	250	176	1,040
28	125	40	84	1,650	97	230	193	176	142	176	290	989
29	71	.....	193	1,530	230	230	158	158	158	30	374	745
30	193	.....	193	1,360	158	193	158	176	111	212	331	838
31	212	.....	230	.....	230	.....	212	158	.....	212	.....	745

NOTE.—Daily discharge is based on a fairly well-defined discharge rating curve above 70 second-feet. Discharges below 70 second-feet are not very accurate.

Monthly discharge of Sebasticook River at Pittsfield, Maine, for 1911.

[Drainage area, 320 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	230	30	132	0.412	0.48	B.
February	212	40	120	.375	.39	B.
March	230	22	132	.412	.48	B.
April	2,990	270	1,390	4.34	4.84	B.
May	1,470	97	465	1.45	1.67	B.
June	270	97	218	.681	.76	B.
July	230	71	169	.528	.61	B.
August	212	84	162	.506	.58	B.
September	212	71	136	.425	.47	B.
October	250	14	152	.475	.55	B.
November	374	125	255	.797	.89	B.
December	1,040	193	544	1.70	1.96	B.
The year	2,990	14	322	1.01	13.68	

COBBOSSEECONTEE STREAM AT GARDINER, MAINE.

Location.—At the dam of the Gardiner Water Power Co., in the city of Gardiner.

Records available.—June 16, 1890, to December 31, 1911.

Drainage area.—240 square miles.

Gages.—One in pond above dam and one in tailrace of power house.

Determination of flow.—The discharge is determined by considering (1) the flow over the dam, usually nothing except for a short time in the spring; (2) the flow through two gates; and (3) the flow through a 39-inch Hercules wheel. The computations are made by the engineers of the S. D. Warren Co., from tables of discharge based on careful experiments.

Winter flow.—Not affected by ice.

Artificial control.—The extensive lakes in the basin are controlled by storage dams and the stream affords a remarkable example of the regularity of flow that can be obtained with proper storage. Except for a short time in the spring no water is wasted.

Accuracy.—Results are considered good for a station of this type.

Cooperation.—Station maintained by the S. D. Warren Co., which furnishes the records for publication.

Daily discharge, in second-feet, of Cobbosseecontee Stream at Gardiner, Maine, for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	a 0	180	120	758	280	260	255	200	200	a 0	110	120
2	130	180	120	a 700	280	260	a 0	200	200	200	110	120
3	130	180	120	595	280	260	250	200	a 0	200	105	a 0
4	130	180	120	420	280	a 0	125	200	200	200	100	120
5	140	a 0	a 0	330	280	260	120	200	200	200	a 0	120
6	150	180	120	310	280	260	200	a 0	200	200	120	120
7	150	180	120	410	a 0	260	200	200	200	200	120	120
8	a 0	180	120	650	280	260	200	200	200	a 0	120	120
9	150	190	120	a 758	280	260	a 0	200	200	160	120	120
10	150	200	120	720	280	260	200	200	a 0	160	120	a 0
11	150	200	120	510	280	a 0	200	200	200	160	120	120
12	150	a 0	a 0	335	280	260	200	200	200	160	a 0	120
13	150	200	120	335	280	260	200	a 0	200	160	120	120
14	150	200	145	335	a 0	260	200	200	200	160	120	120
15	a 0	190	120	430	270	260	200	200	200	a 0	120	120
16	150	175	165	a 505	270	260	a 0	200	200	160	120	120
17	150	170	150	520	270	260	200	200	a 0	160	120	a 0
18	150	170	160	425	270	a 0	200	200	200	135	120	120
19	150	a 0	a 0	335	270	260	200	200	200	145	a 0	120
20	150	170	200	305	270	260	200	a 0	200	160	120	120
21	150	170	200	280	a 0	260	200	200	200	160	120	120
22	a 0	170	200	280	260	260	200	200	200	a 0	120	120
23	150	170	200	a 0	260	260	a 0	200	200	160	120	120
24	150	145	200	280	260	260	200	200	a 0	160	120	a 0
25	150	120	200	280	260	a 0	200	200	200	160	120	30
26	150	a 0	a 0	280	260	260	200	200	200	160	a 0	130
27	150	120	200	280	260	260	200	a 0	200	160	120	185
28	150	120	240	280	a 0	255	200	200	200	130	120	170
29	a 0	.....	280	280	260	255	200	200	200	a 0	120	170
30	180	.....	280	a 0	130	255	a 0	200	200	160	60	170
31	180	.....	520	.....	260	.....	200	200	.....	130	.....	a 0

a Sunday.

Monthly discharge of Cobbosseecontee Stream at Gardiner, Maine, for 1911.

[Drainage area, 240 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	180	0	125	0.521	0.60
February	200	0	148	.617	.64
March	520	0	154	.642	.74
April	758	0	398	1.66	1.85
May	280	0	232	.967	1.11
June	260	0	225	.938	1.05
July	255	0	166	.692	.80
August	200	0	174	.725	.84
September	200	0	173	.721	.80
October	200	0	139	.579	.67
November	120	0	100	.417	.47
December	185	0	105	.438	.50
The year	758	0	178	.742	10.07

ANDROSCOGGIN RIVER BASIN.

ANDROSCOGGIN RIVER AT ERROL DAM, N. H.

Location.—Errol dam, 1 mile above the town of Errol, N. H.

Records available.—January 1, 1905, to December 31, 1911. Data also in annual reports Maine State Water Storage Commission.

Drainage area.—1,095 square miles.

Gage.—Movable rod gage; readings taken each day from the sill of deep gate No. 6; elevation of zero of gage or sill of gate is 1,231.3 feet above mean sea level.

Discharge.—Computed from discharge through fourteen gates in the dam by means of coefficients determined from a few discharge measurements.

The dam is a wooden structure completely housed over, about 175 feet between abutments. The entire flow passes through gates of different sizes, fourteen in all. There is no provision for overflow besides the gates. Beginning at the left end the gates are described as follows:

One gate 10 feet deep by 15 feet wide, seldom used; three gates 10½ feet deep by 15 feet wide, open most of the time; nine gates 15 feet deep by 7 feet wide in the clear (so-called deep gates), open a portion of the time only; one gate 15 feet deep by 5 feet wide, gristmill gate and used only occasionally. The cap of all the fourteen gates is one continuous beam and on the same level, thus making the bottom of the various gates at different levels.

A "dead head" of 2.66 feet exists a short distance above the present dam, this point at present controlling the low flow.

The depth on the deep gates does not indicate the true height of water in Umbagog Lake on account of this "dead head" formed by the old dam and by the bar at "Quick Water Point," the lowest point of which is about 4 feet above the sill of the present dam.

Winter flow.—Little affected by ice.

Artificial control.—Errol dam controls the storage of Umbagog Lake, the lower of the Rangeley series of lakes comprising the principal storage of the Androscoggin River, and amounting to about 19 billion cubic feet, and also a recently developed storage site on Magalloway River created by the Aziscohos dam, which amounts to about 8 billion cubic feet, thus making the total storage about 28 billion cubic feet. Errol dam is located about 5 miles below the outlet of Umbagog Lake and about 3.5 miles below the mouth of Magalloway River, thus making this latter stream one of the feeders of Umbagog Lake.

Accuracy.—The discharge is derived from coefficients applied to the various gate openings as determined from a number of current meter gagings. The ratings, however, are not as thorough as could be desired, and the results are considered very roughly approximate.

Cooperation.—Records are obtained and computations made under the direction of Mr. Walter H. Sawyer, agent for the Union Water Power Co., who furnishes data to the Survey.

Daily discharge, in second-feet, of Androscoggin River at Errol dam, N. H., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,080	791	659	742	2,340	266	1,170	1,200	969	1,270	988	892
2	936	780	659	752	3,550	842	998	348	1,040	771	1,120	826
3	681	756	659	752	4,370	1,190	1,050	1,180	1,020	749	1,230	892
4	801	733	659	764	4,240	1,280	1,100	2,040	1,000	749	1,180	890
5	968	702	669	764	4,040	919	1,190	468	981	414	1,150	1,140
6	968	702	659	780	3,810	903	1,070	1,100	716	476	1,080	1,240
7	973	711	659	780	3,430	881	1,030	1,020	562	936	1,070	1,190
8	973	727	649	792	2,960	856	1,030	220	743	891	1,070	1,160
9	907	713	626	804	2,980	766	1,070	1,330	894	915	1,160	1,100
10	792	713	783	804	2,750	749	1,030	1,290	885	882	1,110	971
11	788	696	846	816	2,660	733	1,030	1,120	872	839	560	771
12	780	696	834	842	2,660	685	1,030	827	865	904	704	344
13	870	687	778	866	2,620	700	1,330	2,440	938	918	820	467
14	867	687	752	900	2,610	700	1,310	1,310	970	914	832	471
15	863	666	752	938	2,380	677	1,220	979	944	688	843	481
16	863	641	742	1,010	1,930	685	1,200	205	847	1,180	781	677
17	852	725	742	1,090	1,620	707	1,250	826	935	1,090	742	758
18	874	815	732	1,160	1,310	822	1,220	1,030	916	1,090	745	918
19	892	787	720	1,230	1,160	733	1,410	741	960	1,120	742	1,000
20	877	774	720	1,270	1,150	731	1,370	509	952	1,210	738	1,010
21	802	743	720	1,290	1,140	728	1,250	833	902	1,270	731	1,000
22	770	728	720	1,370	1,140	717	1,120	1,000	844	1,250	725	1,000
23	856	708	720	1,390	1,130	658	1,110	1,080	800	1,270	794	1,580
24	901	694	720	1,390	1,120	652	1,190	1,070	858	1,340	775	2,070
25	873	694	708	1,420	1,100	648	1,050	1,040	783	1,150	747	2,060
26	855	687	708	1,470	1,090	635	721	982	653	1,010	881	2,060
27	810	677	708	1,750	1,090	618	428	938	727	1,000	1,030	2,030
28	790	669	708	2,330	1,100	613	986	849	941	1,100	1,010	2,020
29	838	.....	720	2,150	1,090	727	867	611	1,280	971	892	2,000
30	871	.....	720	2,080	996	1,080	775	677	1,270	883	829	1,970
31	824	.....	732	.....	907	.....	607	858	.....	909	.....	1,940

Monthly discharge of Androscoggin River at Errol dam, N. H., for 1911.

[Drainage area, 1,095 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	1,080	681	864	0.789	0.91
February	815	641	718	.656	.68
March	846	626	716	.654	.75
April	2,330	742	1,150	1.05	1.17
May	4,370	907	2,140	1.95	2.25
June	1,280	266	763	.697	.78
July	1,410	428	1,070	.977	1.13
August	2,440	205	972	.888	1.02
September	1,280	562	902	.824	.92
October	1,340	414	973	.889	1.02
November	1,230	560	903	.825	.92
December	2,070	344	1,190	1.09	1.26
The year	4,370	205	1,030	.941	12.81

ANDROSCOGGIN RIVER AT RUMFORD FALLS, MAINE.

Location.—The dam of the Rumford Falls Power Co. at Rumford Falls.

Records available.—May 18, 1892, to December 31, 1911. Data also in annual reports Maine State Water Storage Commission.

Drainage area.—2,090 square miles.

Gage.—One located in pond above dam and one in tailrace of power house.

Discharge.—Computed from discharge over the dam, using the customary Francis weir formula with modified coefficient, and the quantities passing through the various wheels of the power house, which have been thoroughly rated.

Winter flow.—Little affected by ice.

Artificial control.—The storage in the Rangeley system of lakes at the headwaters of Androscoggin River, aggregating 28 billion cubic feet, is largely under complete control. The stored water is regulated in the interests of the water-power users below and is under such excellent management that this is one of the best water-power streams in the country.

Accuracy.—Results are believed to be excellent.

Cooperation.—Records are obtained and computations made by Mr. Charles A. Mixer, engineer, Rumford Falls Power Co., who furnishes the data through the district office.

Daily discharge, in second-feet, of Androscoggin River at Rumford Falls, Maine, for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	a 1,530	967	785	1,480	14,600	2,320	1,330	1,410	1,640	a 1,670	1,830	2,820
2	1,540	981	763	a 1,280	15,000	2,370	a 1,380	1,330	1,550	1,630	1,920	2,620
3	2,050	982	781	1,310	13,000	1,790	1,440	1,320	a 1,560	1,640	1,920	a 2,400
4	2,770	1,030	737	1,230	9,150	a 1,980	1,410	1,350	1,560	1,650	1,770	1,620
5	2,000	a 989	a 712	1,210	7,550	1,860	1,390	1,340	1,570	2,310	a 1,720	1,550
6	1,900	978	693	1,190	6,480	2,170	1,520	a 1,240	1,710	2,400	1,820	1,820
7	1,880	974	724	2,060	a 6,300	1,910	1,380	1,140	1,730	1,930	2,230	2,180
8	a 1,850	956	736	4,470	6,980	1,880	1,320	1,300	1,570	a 1,900	2,650	2,070
9	1,690	900	744	a 3,590	6,580	1,860	a 1,360	1,270	1,450	1,860	2,350	2,140
10	1,750	931	628	2,810	6,130	1,550	1,390	1,200	a 1,430	1,790	2,220	a 2,220
11	1,620	1,000	762	2,760	5,600	a 1,530	1,370	1,310	1,440	1,680	2,080	2,310
12	1,440	a 1,020	a 638	2,730	5,000	1,520	1,320	1,510	1,340	1,730	a 2,070	2,880
13	1,410	1,000	707	3,250	4,560	2,360	1,670	a 1,440	1,370	1,640	3,600	3,870
14	1,380	995	716	4,280	a 4,210	2,400	1,190	1,360	1,400	1,750	2,830	3,910
15	a 1,440	1,040	718	5,490	3,890	2,240	1,120	1,350	1,460	a 1,740	2,610	2,940
16	1,300	977	742	a 7,470	3,820	1,880	a 1,190	1,430	1,610	1,720	2,380	2,730
17	1,200	965	708	5,920	3,500	1,860	1,260	1,600	a 1,390	1,660	1,870	a 2,650
18	1,110	947	695	5,430	3,270	a 1,790	1,620	1,430	1,570	1,650	2,300	2,610
19	1,150	a 912	a 668	5,000	3,010	1,730	1,590	1,620	1,570	2,620	a 2,420	2,140
20	1,180	987	658	5,750	2,820	1,700	1,410	a 1,550	1,460	2,820	2,550	1,690
21	1,220	926	666	5,280	a 1,890	1,550	1,360	1,480	1,440	2,580	2,340	2,110
22	a 1,170	912	655	4,690	2,430	1,620	1,430	1,450	1,390	a 2,590	1,890	2,270
23	1,140	882	627	a 4,020	2,590	1,600	a 1,380	1,280	1,560	2,600	1,780	3,070
24	1,160	900	657	4,060	2,110	1,600	1,340	1,310	a 1,550	2,630	2,090	a 4,150
25	1,110	912	643	6,260	2,520	a 1,490	1,440	1,320	1,530	2,320	2,020	4,360
26	1,150	a 871	a 639	7,920	2,680	1,380	1,330	1,410	1,700	2,120	a 2,100	3,940
27	1,230	830	625	9,740	2,480	1,590	1,300	a 1,420	1,660	2,050	2,180	3,670
28	1,110	858	875	12,400	a 2,160	1,470	1,360	1,420	1,620	2,020	2,000	3,000
29	a 1,020	.....	1,430	14,500	1,850	1,450	1,380	2,290	1,550	a 1,960	2,710	1,960
30	925	.....	1,760	a 14,800	1,780	1,390	a 1,430	2,200	1,720	1,910	2,950	2,170
31	1,070	.....	1,580	.....	1,710	.....	1,480	1,900	.....	1,920	.....	a 2,420

a Sunday.

Monthly discharge of Androscoggin River at Rumford Falls, Maine, for 1911.

[Drainage area, 2,090 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	2,770	925	1,440	0.689	0.79
February	1,040	830	951	.455	.47
March	1,760	625	789	.378	.44
April	14,800	1,190	5,080	2.43	2.71
May	15,000	1,710	5,020	2.40	2.77
June	2,400	1,380	1,790	.856	.96
July	1,670	1,120	1,380	.660	.76
August	2,290	1,140	1,450	.694	.80
September	1,730	1,340	1,540	.737	.82
October	2,820	1,630	2,020	.967	1.11
November	3,600	1,720	2,240	1.07	1.19
December	4,360	1,550	2,650	1.27	1.46
The year	15,000	625	2,200	1.05	14.28

PRESUMPSCOT RIVER BASIN.

PRESUMPSCOT RIVER AT OUTLET OF SEBAGO LAKE, MAINE.

Location.—Outlet dam at Sebago Lake and the hydro-electric plant at Eel Weir Falls, 1 mile below lake outlet.

Records available.—January 1, 1887, to December 31, 1911. Data also in annual reports, Maine State Water Storage Commission.

Drainage area.—436 square miles.

Gages.—On the bulkhead of the gate house at the outlet dam and in the fore bay and tailrace of the power plant.

Discharge.—Prior to March, 1904, the discharge was deduced from the records of the opening of the gates in the dam, the discharge capacity of which under different conditions of head has been determined and tabulated by Mr. Hiram F. Mills, of Lowell.

In March, 1904, a hydro-electric plant was completed at Eel Weir Falls, the water being brought directly from the outlet dam to the plant by means of a canal about a mile long. This new plant has necessitated a different method of recording the flow from the lake. The water passes through three pairs of 30-inch Hercules wheels, the amount being recorded by three Allen meters, one on each pair. These meters were rated by the result of a test at Holyoke, Mass., of one pair of the wheels. Since the station was finished the performance of the wheels and of the recording meters has been checked by current-meter measurements, brake tests of the wheels, and electrical readings of the generator output. It is usually desired to keep a constant flow through the canal, and when demands for power are not sufficient to utilize the entire flow through the wheels, the excess of water is run off through a pair of regulating gates at the power station. A record of the opening of these gates is kept and the flow computed from a coefficient determined from current meter tests.

The flow at times from the lake may be greater than is safe to carry through the canal, though this has not yet happened. At such times it will be necessary to draw a part of the water through the old regulating gates in the main dam.

Winter flow.—No trouble from ice.

Artificial control.—Sebago Lake, with an area of 46 square miles, is under complete control for storage. It is a magnificent natural storage reservoir and its utilization for this purpose has made the regimen of flow of the Presumpscot extremely regular.

Accuracy.—Results are very good for a station of this type.

Cooperation.—Records obtained and computations made and furnished by the S. D. Warren Co.

Daily discharge, in second-feet, of Presumpscot River at outlet of Sebago Lake, Maine, for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	a 250	335	420	243	335	340	293	172	163	a122	545	452
2	335	330	417	a 130	342	342	a 73	175	143	337	542	457
3	333	333	422	337	340	268	170	175	a 67	330	543	a 160
4	338	323	417	308	342	a 115	133	170	173	337	540	438
5	333	a 242	a 185	325	338	338	338	142	248	337	a 345	422
6	335	410	342	308	335	345	338	a 58	267	342	540	420
7	338	412	338	198	a 118	337	342	172	277	330	540	420
8	a 253	430	340	163	340	337	322	175	278	a 122	542	422
9	338	423	338	a 103	347	337	a 42	172	273	332	540	417
10	335	413	375	278	345	337	267	183	a 113	337	537	a 207
11	335	422	338	277	343	a 280	273	168	277	337	533	420
12	342	a 237	a 162	277	340	343	275	152	277	337	a 192	423
13	338	428	337	278	345	347	275	a 112	275	337	537	423
14	333	427	340	277	a 73	332	267	177	277	332	542	420
15	a 123	420	335	277	343	343	243	175	277	a 130	538	423
16	338	420	338	a 275	343	333	a 102	175	273	335	540	418
17	332	420	337	340	343	342	233	207	a 198	335	542	a 197
18	335	420	342	343	347	a 295	237	203	277	337	538	417
19	338	a 150	a 180	350	343	338	395	160	278	338	a 187	417
20	337	423	343	343	335	333	247	a 58	277	332	542	417
21	330	418	328	340	a 122	338	242	177	277	335	540	420
22	a 125	422	335	342	345	338	225	173	277	a 122	540	417
23	338	420	342	a 277	337	345	a 52	173	285	340	542	343
24	343	422	342	345	342	307	180	180	a 143	340	537	a 137
25	333	410	328	338	347	a 107	173	172	422	347	535	420
26	333	a 143	a 167	343	335	342	170	140	413	342	a 255	417
27	333	427	345	342	330	335	168	a 58	418	335	448	423
28	343	422	295	340	a 112	362	168	172	425	333	455	422
29	a 150	.....	262	338	335	338	173	172	420	a 142	453	427
30	320	.....	198	a 153	333	303	a 62	170	417	547	457	420
31	305	.....	217	.....	338	.....	202	172	.....	545	.....	a 250

a Sunday.

Monthly discharge of Presumpscot River at outlet of Sebago Lake, Maine, for 1911.

[Drainage area, 436 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	343	123	309	0.709	0.82
February	430	143	375	.860	.90
March	422	162	316	.725	.84
April	350	103	286	.656	.73
May	347	73	310	.711	.82
June	362	107	317	.727	.81
July	395	42	215	.493	.57
August	207	58	159	.365	.42
September	425	67	273	.626	.70
October	547	122	316	.725	.84
November	545	187	489	1.12	1.25
December	457	137	383	.878	1.01
The year	547	42	312	.716	9.71

SACO RIVER BASIN.

SACO RIVER NEAR CENTER CONWAY, N. H.

Location.—At the wooden highway bridge between Center Conway and Redstone, N. H., about 2 miles from each place, about 3 miles below the mouth of Swift River and 2 miles above the outlet of Conway Lake.

Records available.—August 26, 1903, to December 31, 1911. Data also in annual reports of the Maine State Water Storage Commission.

Drainage area.—385 square miles.

Gage.—Chain attached to bridge; datum unchanged.

Channel.—Recent measurements indicate radical changes in conditions of flow; but insufficient measurements have been taken to define the new discharge rating curve. Channel broken by one pier.

Discharge measurements.—Made from the bridge or by wading.

Winter flow.—So affected by ice that gage height observations are discontinued.

Cooperation.—Established in cooperation with the New Hampshire Forestry Commission; since 1904 maintained by the United States Geological Survey.

The following measurement was made by Adams and Coffin:
October 20, 1911: Gage height, 5.15 feet; discharge, 1,160 second-feet.

Daily gage height, in feet, of Saco River near Center Conway, N. H., for 1911.

[Fred Masterton, Observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	.....	.....	.....	9.0	5.0	3.55	3.49	3.36	3.70	4.30	4.90
2	.....	.....	.....	6.6	9.6	4.85	3.49	3.47	3.33	3.65	4.00	4.65
3	.....	.....	.....	.....	7.8	4.35	3.46	3.37	3.30	3.75	3.85	4.45
4	.....	.....	.....	.....	6.6	4.10	3.44	3.29	3.24	3.70	3.80	4.25
5	.....	6.2	5.5	.....	6.2	4.00	3.39	3.27	3.21	4.90	3.70	4.50
6	.....	.....	.....	.....	6.1	3.95	3.34	3.21	3.30	4.75	3.70	4.65
7	.....	.....	.....	.....	6.1	3.95	3.31	3.18	3.95	4.20	4.35	.....
8	4.85	.....	.....	.....	6.7	4.45	3.35	3.20	3.55	3.95	4.95	.....
9	.....	.....	.....	.....	7.0	4.20	3.27	3.16	3.46	3.80	4.40	4.15
10	.....	.....	.....	5.4	6.5	4.00	3.27	3.14	3.50	3.75	4.20	4.12
11	.....	.....	.....	5.2	6.3	3.90	3.23	3.17	3.47	3.65	4.15	4.15
12	.....	6.2	5.5	5.2	6.2	4.55	3.21	3.44	3.38	3.60	4.10	4.70
13	.....	.....	.....	5.3	6.2	5.3	3.23	3.34	3.40	3.55	4.25	5.3
14	.....	.....	.....	5.9	5.6	5.0	3.25	3.22	3.36	3.50	4.55	5.2
15	7.2	.....	.....	7.1	5.3	4.90	3.15	3.18	3.32	3.49	4.40	4.65
16	.....	.....	.....	6.9	5.3	4.55	3.15	3.24	3.80	3.47	4.25	4.50
17	.....	.....	.....	6.4	5.1	4.60	3.17	3.38	3.80	3.46	3.68	4.45
18	.....	.....	.....	6.1	4.9	4.35	3.37	3.38	3.60	3.48	4.30	4.30
19	.....	6.1	5.6	6.0	4.8	4.15	3.80	3.26	3.46	5.5	4.40	4.15
20	.....	.....	.....	6.3	4.75	4.20	3.45	3.60	3.40	5.2	4.20	4.30
21	.....	.....	.....	6.0	4.70	4.10	3.43	3.44	3.34	4.70	4.15	4.65
22	6.8	.....	.....	5.8	5.0	3.95	3.36	3.26	3.34	4.50	3.95	.....
23	.....	.....	.....	5.5	4.55	3.90	3.27	3.20	3.50	5.2	4.00	6.1
24	.....	.....	.....	5.4	4.55	3.80	3.24	3.12	3.43	5.2	4.00	5.8
25	.....	.....	.....	6.3	4.50	3.70	3.35	3.11	3.38	4.65	4.10	5.1
26	.....	5.7	5.7	6.9	4.55	3.75	3.27	3.14	3.42	4.40	3.95	4.85
27	.....	.....	.....	7.3	4.35	3.67	3.25	3.18	3.43	4.20	4.05	4.75
28	.....	.....	.....	8.2	4.20	3.70	3.25	3.22	3.41	4.15	4.00	4.55
29	6.2	.....	.....	8.7	4.10	3.70	3.95	3.95	3.46	4.00	5.8	5.6
30	.....	.....	.....	8.6	4.00	3.67	4.05	3.85	3.60	3.95	5.3	.....
31	.....	.....	.....	.....	3.95	.....	3.65	3.50	.....	3.90	.....	.....

NOTE.—The river was frozen Jan. 1 to Apr. 10. Gage heights are to water surface. Probably no ice effect in December.

SACO RIVER AT WEST BUXTON, MAINE.

Location.—Hydro-electric plant of the Portland Electric Co. at West Buxton, Maine.

Records available.—October 19, 1907, to December 31, 1911. Data also in annual reports Maine State Water Storage Commission.

Drainage area.—1,550 square miles.

Gages.—One in pond above dam and one in tail race of power house.

Channel.—Crest of the concrete dam, about 300 feet long.

Discharge.—Discharge computed from flow over the dam and through the rated wheels of the power plant based upon gage readings taken every hour.

Winter flow.—No trouble from ice.

Artificial control.—There are dams on numerous although comapratively small lakes in the basin above the station. Regulation of storage probably has some effect on the regimen of the stream but not to the extent that obtains in the other basins in the State of Maine where natural storage facilities are better and more fully developed.

Accuracy.—Results believed to be good for a station of this type.

Cooperation.—Records obtained and computations made and furnished by the Portland Electric Co., James A. Fleet, general manager.

Daily discharge, in second-feet, of Saco River at West Buxton, Maine, for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	a 290	800	780	3,390	9,790	2,240	1,120	1,100	500	a 410	1,410	2,230
2	1,850	980	790	a2,600	10,310	2,250	a 960	930	490	750	1,500	2,270
3	1,260	1,040	780	2,860	10,900	2,070	1,240	970	a 350	720	1,420	a2,110
4	1,530	1,120	660	2,690	11,020	a1,350	600	950	330	250	1,370	2,540
5	1,490	a 650	a 560	2,740	10,760	1,920	1,380	780	690	690	a1,030	2,050
6	1,600	1,230	920	2,760	9,940	1,940	1,150	a 580	540	710	1,600	1,870
7	1,920	1,010	910	3,750	a8,560	1,750	1,000	880	570	680	1,580	1,860
8	a1,630	950	720	5,730	8,020	1,680	850	770	520	a 770	1,700	1,810
9	2,100	1,010	930	a5,860	7,100	1,810	a 450	780	440	970	1,660	1,760
10	1,870	980	770	6,070	6,710	1,640	1,030	580	a 260	1,880	1,850	a1,380
11	1,850	1,110	560	5,550	6,100	a1,020	740	530	630	1,600	1,830	1,950
12	1,800	a 520	a 510	5,620	5,820	1,720	790	640	790	1,360	a1,280	1,910
13	1,690	1,100	710	6,050	4,880	1,780	780	a 620	680	1,460	1,730	1,870
14	1,630	1,020	840	6,850	a5,510	1,860	760	570	670	970	1,650	1,870
15	a1,090	780	880	8,030	5,290	2,230	1,150	590	670	a 820	1,760	1,960
16	1,690	860	800	a8,850	4,630	2,540	a 310	600	440	1,290	1,810	2,120
17	1,500	970	840	10,140	4,220	2,700	820	660	a 360	1,410	1,910	a1,960
18	1,370	720	710	9,660	4,080	a2,390	840	690	640	1,520	1,950	2,490
19	1,360	a 540	a 630	9,350	3,410	2,700	730	710	850	1,230	a1,870	2,180
20	1,280	930	890	9,380	3,350	2,490	1,050	a 440	710	1,110	2,220	2,030
21	1,330	880	900	9,060	a2,700	2,120	1,030	540	790	1,030	1,990	1,800
22	a 790	730	980	8,770	2,950	1,980	940	490	830	a 530	1,830	1,180
23	1,630	800	1,000	a8,210	2,750	1,890	a 700	560	510	1,300	1,800	1,990
24	1,380	850	940	8,390	2,850	1,650	1,420	570	a 270	1,450	1,590	a2,840
25	1,100	670	700	7,500	2,890	a1,060	840	510	590	1,270	1,890	3,510
26	1,220	a 620	a 650	7,460	2,960	1,560	820	340	700	1,430	a1,400	3,360
27	1,330	970	1,100	7,530	2,690	1,750	1,010	a 190	620	1,680	1,850	3,450
28	1,150	790	1,520	7,810	a2,140	1,110	670	510	600	1,600	1,690	3,350
29	a 720	.....	1,760	8,000	2,580	1,530	870	490	710	a1,140	1,510	2,780
30	1,370	.....	2,700	a8,460	2,180	1,330	a 760	510	540	1,690	1,710	1,660
31	1,190	.....	3,410	.....	1,860	.....	910	560	.....	1,360	.....	a 960

a Sunday.

Monthly discharge of Saco River at West Buxton, Maine, for 1911.

[Drainage area, 1,550 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	2,100	290	1,420	0.916	1.06
February	1,230	520	880	.568	.59
March	3,410	510	995	.642	.74
April	10,140	2,600	6,640	4.28	4.78
May	11,020	1,860	5,450	3.52	4.06
June	2,700	1,020	1,870	1.21	1.35
July	1,420	310	894	.577	.67
August	1,100	190	634	.409	.47
September	850	260	576	.372	.42
October	1,880	250	1,130	.729	.84
November	2,220	1,030	1,680	1.08	1.20
December	3,510	960	2,160	1.39	1.60
The year	11,020	190	2,030	1.31	17.78

MERRIMAC RIVER BASIN.

PEMIGEWASSET RIVER AT PLYMOUTH, N. H.

Location.—In the town of Plymouth, about 40 feet above the covered wooden highway bridge three-fourths of a mile below the mouth of Bakers River.

Records available.—1886 to December 31, 1911.

Drainage area.—615 square miles.

Gages.—Two gages have been maintained at this station. From September 4, 1903, to June 30, 1907, readings were taken with the chain gage established by the United States Geological Survey on the upstream side of the bridge; the datum of this gage has remained the same during the maintenance of the station. Since June 30, 1907, gage heights have been furnished by the Locks & Canals Co., of Lowell, Mass., from readings taken on the staff gage, the low and medium stage sections of which are about 40 feet above the bridge and on the same side of the river as the chain gage. The high-stage section is bolted to the upstream side of the right abutment. The datum of this gage is 1.11 feet higher than that of the chain gage. All gage readings prior to 1910 were reduced to chain gage datum. At low stages the difference in readings between the two gages is 1.11 feet; at 8.1 feet on the staff gage the difference is 0.99 feet. Owing to the slight difference in the relation of stage to discharge at the locations of the two gages and to the fact that gage readings are now taken on the staff gage, it is considered advisable to publish all gage heights beginning with 1910 exactly as received from the Locks & Canals Co., namely as referred to the staff gage datum.

Channel.—Rocky and probably fairly permanent in the right channel; fine gravel, shifting occasionally at times of high floods, in the left channel.

Discharge measurements.—Made from the bridge at ordinary and high stages. At low stages the right channel is measured from the bridge and the left channel by wading.

Artificial control.—The nearest dam upstream is at the pulp mills at Livermore Falls, 3 miles above. Downstream the nearest dam is at Franklin, 25 miles distant. The control of the flow at Livermore Falls and also at the dam at Woodstock, 17 miles upstream, affects the low-water discharge.

Winter flow.—Affected by ice, which forms on the control about 300 feet below the bridge. Discharge from sewer entering a short distance above the gage usually keeps the river open on right bank near the staff gage.

Accuracy.—Estimates of discharge covering the period from 1886–1903 were made and published in Water-Supply 124, pages 97–101. At the time these estimates were published it was believed that conditions of flow were stable, but two quite radical changes have since occurred, one in 1905 and one in 1910, the discharge at a stage of 1.2 feet (chain gage) having varied as follows: 1904, discharge 110 second-feet; 1905, discharge 158 second-feet; 1910, discharge 213 second-feet. Hence, these earlier estimates of discharge should be used with caution for low stages, although they are probably essentially correct for medium and high stages. For the period since 1903 good discharge rating curves have been developed. Conditions for obtaining accurate discharge data are good, except at low stages, when the control of the flow at Livermore Falls affects the accuracy of the computed values of daily discharge.

Cooperation.—Established in 1903 in cooperation with the New Hampshire Forestry Commission. Gage heights since June 30, 1907, furnished by the Locks & Canals Co., of Lowell, Mass.

Discharge measurements of Pemigewasset River at Plymouth, N. H., in 1911.

Date.	Hydrographer.	Gage height.[a]	Discharge.
		Feet.	*Sec.-ft.*
Apr. 27	Covert and De Golyer	7.06	6,760
May 23	C. C. Covert	2.50	880
July 3	....do	.68	94
Dec. 2	H. H. Halsey	2.82	1,350

[a] Gage heights refer to chain gage.

Daily gage height, in feet, of Pemigewasset River at Plymouth, N. H., for 1911.

[Frank Morton, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	2.0	2.0	4.7	8.0	2.8	.....	0.5	0.28	.....	1.6	2.1
2	2.6	2.0	2.0	.....	8.9	2.1	.....	.85	.33	1.35	1.55	1.7
3	2.8	2.0	2.1	3.6	6.1	1.4	0.24	.4	.....	1.4	1.35	.....
4	6.2	2.1	2.2	3.2	4.4	.....	− .04	.38	.35	1.75	1.25	1.15
5	3.2	.....	.....	3.1	3.5	1.0	− .17	.04	.30	3.7	.....	1.0
6	3.6	2.1	1.9	2.0	2.8	.9	− .22	.....	.38	2.6	1.1	1.4
7	3.5	1.9	2.0	3.8	.....	.9	− .17	− .11	1.55	1.9	1.55	1.55
8	.....	1.9	2.2	6.5	3.8	.85	− .20	.33	1.0	.....	2.3	1.35
9	3.0	1.8	2.4	.....	3.7	.85	.....	.11	.8	1.45	1.8	1.2
10	2.8	1.8	2.1	5.4	3.6	.75	+ .03	− .09	.....	1.2	1.55	.....
11	2.6	1.7	1.8	4.7	3.2	.....	− .14	.10	.95	1.2	1.5	1.55
12	2.4	.....	.....	5.5	3.2	.65	+ .16	.5	.7	1.05	.....	2.0
13	2.3	1.7	1.6	5.7	2.9	1.4	− .50	.....	.75	.9	1.8	3.7
14	2.1	1.6	1.7	6.8	.....	1.6	− .43	.27	.6	.8	1.9	3.0
15	.....	2.2	1.7	9.1	2.3	1.8	− .41	− .21	.5	.....	1.7	2.3
16	1.8	2.2	1.8	.....	2.2	1.4	.....	.17	2.0	.6	1.6	2.0
17	2.0	2.1	1.8	4.6	2.0	1.15	− .01	.4	.....	.5	1.4	.....
18	1.8	2.0	1.8	3.5	1.8	.....	1.0	.27	1.05	1.05	1.55	1.3
19	2.8	.....	.....	3.8	1.8	1.0	.9	.29	.7	4.8	.....	1.35
20	1.9	1.8	2.2	4.7	1.6	.85	.4	.....	.6	3.2	1.8	1.25
21	1.8	2.1	2.2	3.6	.....	.85	.38	.55	.6	2.4	1.6	1.35
22	.....	2.2	2.3	4.1	1.4	.75	.31	.38	.55	.....	1.5	1.45
23	1.8	1.9	2.3	.....	1.25	.75	.....	.25	1.0	3.3	1.25	4.4
24	1.7	1.9	2.2	3.4	1.15	.75	.19	.23	1.6	3.1	1.1	5.0
25	1.5	1.8	2.1	5.5	1.35	.....	− .06	.07	.65	2.2	1.2	3.1
26	1.5	.....	.....	6.4	1.6	.65	.19	− .09	.95	1.8	.....	2.3
27	1.9	1.8	2.5	7.0	1.4	.6	− .36	.....	.95	1.85	1.15	2.0
28	2.0	1.7	3.0	7.8	.....	.6	− .26	− .07	.8	1.55	1.2	1.65
29	.....	.....	6.2	8.5	1.1	.5	.75	2.2	.8	.....	3.2	1.4
30	2.0	.....	6.0	.....	1.0	.42	.....	1.35	1.1	1.25	2.6	1.65
31	2.2	.....	5.8	.....	.9	.....	1.0	.9	.....	1.25	.....	.....

NOTE.—Relation of gage heights to discharge affected by ice from Jan. 1 to about Mar. 26. Probably no effect during December.

Daily discharge, in second-feet, of Pemigewasset River at Plymouth, N. H., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	4,610	10,400	2,230	315	375	280	819	1,100	1,530
2	.....	3,880	12,200	1,530	290	570	301	908	1,060	1,180
3	.....	3,140	6,830	945	265	330	305	945	908	972
4	.....	2,660	4,190	805	176	322	309	1,220	835	765
5	.....	2,560	3,020	665	144	198	288	3,260	782	665
6	.....	1,440	2,230	600	133	178	322	2,020	730	945
7	.....	3,380	2,800	600	144	158	1,060	1,350	1,060	1,060
8	.....	7,530	3,380	570	137	301	665	1,170	1,720	908
9	.....	6,600	3,260	570	163	219	540	982	1,260	800
10	.....	5,680	3,140	510	189	163	586	800	1,060	930
11	.....	4,610	2,660	481	151	216	632	800	1,020	1,060
12	.....	5,840	2,660	452	236	375	480	698	1,140	1,440
13	.....	6,160	2,340	945	80	326	510	600	1,260	3,260
14	.....	8,070	2,030	1,100	92	277	425	540	1,350	2,440
15	.....	12,600	1,720	1,260	95	135	375	482	1,180	1,720
16	.....	8,540	1,620	945	139	240	1,440	425	1,100	1,440
17	.....	4,470	1,440	765	183	330	1,070	330	945	1,160
18	.....	3,020	1,260	715	665	277	698	698	1,060	870
19	.....	3,380	1,260	665	600	284	480	4,760	1,160	908
20	.....	4,610	1,100	570	330	342	425	2,660	1,260	835
21	.....	3,140	1,020	570	322	400	425	1,820	1,100	908
22	.....	3,780	945	510	292	322	400	2,300	1,020	982
23	.....	3,340	835	510	270	269	665	2,780	835	4,190
24	.....	2,900	765	510	247	261	1,100	2,560	730	5,060
25	.....	5,840	908	481	170	207	452	1,620	800	2,560
26	.....	7,350	1,100	452	247	163	632	1,260	782	1,720
27	1,920	8,450	945	425	105	166	632	1,310	765	1,440
28	2,440	9,780	838	425	124	168	540	1,060	800	1,140
29	7,000	11,400	730	375	510	1,620	540	948	2,660	945
30	6,660	10,900	665	339	588	908	730	835	2,020	1,140
31	6,320	.....	600	.....	665	600	.....	835	.....	1,000

NOTE.—Daily discharge determined from a rating curve well defined between 200 and 15,000 second-feet.
Discharge interpolated for days when gage was not read.

Monthly discharge of Pemigewasset River at Plymouth, N. H., for 1911.

[Drainage area, 615 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	.....	.....	525	0.854	0.98	D.
February	.....	.....	325	.528	.55	D.
March	7,000	.....	1,100	1.79	2.06	D.
April	12,600	1,440	5,660	9.20	10.26	A.
May	12,200	600	2,540	4.13	4.76	A.
June	2,230	339	717	1.17	1.30	A.
July	665	80	260	.423	.49	A.
August	1,620	135	345	.561	.65	A.
September	1,440	280	577	.938	1.05	A.
October	4,760	330	1,380	2.24	2.58	A.
November	2,660	730	1,120	1.82	2.03	A.
December	5,060	665	1,480	2.41	2.78	B.
The year	12,600	80	1,340	2.18	29.49	

NOTE.—Discharge for the period during which ice was present estimated by means of climatologic records and the discharge at Garvins Falls. Mean discharge Mar. 1-26, estimated, 380 second-feet.

MERRIMAC RIVER AT FRANKLIN JUNCTION, N. H.

Location.—At covered wooden bridge of the Boston & Maine Railroad near Franklin Junction, N. H., about 1 mile below the confluence of Pemigewasset and Winnepesaukee rivers.

Records available.—July 8, 1903, to December 31, 1911.

Drainage area.—1,460 square miles.

Gage.—Standard chain fastened to floor of bridge on upstream side over the right-hand channel. A gage painted on the downstream right-hand side of the center pier is used by the United States Weather Bureau for high-water readings.

Channel.—Coarse gravel and bowlders; fairly permanent.

Discharge measurements.—Made from upstream side of the bridge.

Winter flow.—Ice usually affects the relation between gage height and discharge for short periods during the winter months.

Artificial control.—Several dams above the station on both Pemigewasset and Winnepesaukee rivers affect the discharge. The operation of the mills above the station causes more or less fluctuation in stage each working day. It is not known how much this affects the reliability of the records. Winnepesaukee, Squam, and New Found lakes also offer opportunities for storage and are under more or less regulation.

Accuracy.—During open-water periods the results are believed to be fairly good.

Cooperation.—All of the data published by the United States Geological Survey are based on readings from chain gage which have been furnished by the Locks & Canals Co., of Lowell, Mass., since June 30, 1907.

The following discharge measurement was made by C. S. De Golyer:
April 27, 1911: Gage height, 9.50 feet; discharge, 11,500 second-feet.

Daily gage height, in feet, of Merrimac River at Franklin Junction, N. H., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	4.45	4.05	.....	10.2	4.12	4.02	4.22	4.38	.....	4.72	4.98
2	4.32	4.35	4.02	.....	11.05	5.2	.....	4.18	4.28	4.32	4.72	4.82
3	4.52	4.55	4.02	6.25	9.8	5.15	3.98	4.05	.....	4.35	4.85	.....
4	4.55	4.48	3.95	5.5	7.55	.....	3.85	4.05	4.18	4.7	4.88	4.82
5	4.45	.....	.....	5.22	6.42	4.88	3.92	4.02	4.05	6.1	.....	4.5
6	4.35	4.45	4.02	5.35	6.28	4.5	4.0	.....	4.1	6.08	4.78	4.52
7	4.85	4.9	4.02	6.05	.....	4.38	3.82	3.95	4.8	5.35	4.92	4.42
8	.....	5.32	3.95	6.75	6.22	4.22	3.8	3.98	4.58	.....	5.75	4.45
9	5.2	4.02	4.02	.....	6.4	4.02	.....	4.0	4.42	4.95	5.48	4.38
10	5.05	3.92	3.92	6.8	6.48	4.12	3.78	3.95	.....	4.82	5.28	.....
11	4.98	4.12	3.85	6.68	6.25	.....	3.75	4.0	4.38	4.72	5.32	4.68
12	4.92	.....	.....	6.58	6.18	.....	3.8	3.95	4.35	4.58	.....	5.0
13	4.85	4.35	3.95	6.95	5.92	4.65	3.78	.....	4.32	4.45	5.75	6.22
14	4.78	4.35	4.0	8.1	.....	.....	3.8	3.98	4.28	4.42	5.6	6.0
15	.....	4.22	3.92	10.25	5.78	.....	3.78	3.9	4.3	.....	5.4	6.05
16	4.72	4.25	3.9	.....	5.65	.....	.....	3.92	4.55	4.38	5.12	5.35
17	4.55	4.2	3.88	8.55	5.4	.....	3.8	3.98	.....	4.32	5.08	.....
18	4.5	4.2	3.98	7.65	5.18	.....	3.82	4.05	4.5	4.52	5.02	.....
19	4.52	.....	.....	7.15	4.95	.....	3.92	3.98	4.4	5.7	.....	5.1
20	4.45	4.2	4.05	7.7	4.92	.....	4.08	.....	4.38	6.78	5.2	4.92
21	4.42	4.2	3.98	7.42	.....	.....	4.0	4.02	4.32	6.3	5.08	4.92
22	.....	.....	4.0	7.28	4.82	.....	4.02	4.02	4.3	.....	4.95	5.05
23	4.32	.....	4.02	.....	4.78	4.18	.....	3.92	4.28	4.78	4.82	6.0
24	4.28	.....	4.02	6.92	4.62	4.15	3.98	3.95	.....	6.58	4.75	.....
25	4.2	.....	4.12	7.75	4.62	.....	3.88	3.92	4.25	6.35	4.82	.....
26	4.18	.....	.....	8.65	4.68	4.02	3.9	3.9	4.28	6.28	.....	6.08
27	4.28	4.22	4.3	9.18	4.7	4.0	3.9	.....	4.2	5.92	4.75	5.85
28	4.2	4.2	4.72	9.78	.....	4.1	3.9	3.88	4.18	5.38	4.75	5.75
29	.....	.....	6.25	10.35	4.62	4.02	4.05	3.98	4.22	.....	5.08	4.65
30	4.28	.....	6.88	.....	4.05	4.0	.....	4.78	4.28	4.95	5.02	4.48
31	4.45	.....	.....	.....	3.7	.....	4.15	4.4	.....	4.88	.....	.....

NOTE.—Relation of gage height to discharge affected by ice from about Jan. 5 to Feb. 28 and possibly during March.
It is not known whether readings were to water surface or to top of ice.

Daily discharge, in second-feet, of Merrimac River at Franklin Junction, N. H., for 1911.

Day.	Jan.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,460	1,120	7,000	12,300	1,200	1,080	1,320	1,520	1,420	1,980	2,350
2	1,450	1,080	5,000	14,100	2,680	1,060	1,280	1,400	1,450	1,980	2,120
3	1,710	1,080	4,450	11,500	2,600	1,040	1,120	1,340	1,480	2,160	2,120
4	1,740	1,000	3,160	6,900	2,400	900	1,120	1,280	1,950	2,200	2,120
5	.....	1,040	2,710	4,760	2,200	972	1,080	1,120	4,180	2,130	1,680
6	.....	1,080	2,920	4,500	1,680	1,060	1,040	1,180	4,140	2,060	1,710
7	.....	1,080	4,090	4,450	1,520	870	1,000	2,090	2,920	2,260	1,580
8	.....	1,000	5,360	4,400	1,320	850	1,040	1,780	2,960	3,580	1,620
9	.....	1,080	7,000	4,720	1,080	840	1,060	1,580	2,300	3,130	1,520
10	.....	972	5,460	4,860	1,200	830	1,000	1,550	2,120	2 810	1,720
11	.....	900	5,230	4,450	1,420	800	1,060	1,520	1,980	2,870	1,920
12	.....	950	5,040	4,320	1,650	850	1,000	1,480	1,780	3,220	2,380
13	.....	1,000	5,740	3,860	1,880	830	1,020	1,450	1,620	3,580	4,400
14	.....	1,060	8,000	3,740	1,900	850	1,040	1,400	1,580	3,320	4,000
15	.....	972	12,400	3,630	2,100	830	950	1,420	1,550	3,000	4,090
16	.....	950	12,000	3,400	2,300	840	972	1,740	1,520	2,560	2,920
17	.....	930	8,900	3,000	1,700	850	1,040	1,710	1,450	2,500	2,790
18	.....	1,040	7,100	2,650	1,400	870	1,120	1,680	1,710	2,410	2,660
19	.....	1,080	6,120	2,300	1,600	972	1,040	1,550	3,490	2,540	2,530
20	.....	1,120	7,200	2,260	1,700	1,160	1,060	1,520	5,420	2,680	2,260
21	.....	1,040	6,640	2,190	1,600	1,060	1,080	1,450	4,540	2,500	2,260
22	.....	1,060	6,370	2,120	1,500	1,080	1,080	1,420	3,300	2,300	2,460
23	.....	1,080	6,030	2,060	1,280	1,060	972	1,400	2,060	2,120	4,000
24	.....	1,080	5,690	1,840	1,240	1,040	1,000	1,380	5,040	2,020	4,150
25	.....	1,200	7,300	1,840	1,160	930	972	1,360	4,630	2,120	4,300
26	.....	1,310	9,100	1,920	1,080	950	950	1,400	4,500	2,070	4,140
27	.....	1,420	10,200	1,950	1,060	950	940	1,300	3,860	2,020	3,740
28	.....	1,980	11,400	1,900	1,180	950	930	1,280	2,970	2,020	3,580
29	.....	4,450	12,600	1,840	1,080	1,120	1,040	1,320	2,980	2,500	1,880
30	.....	5,610	13,000	1,120	1,060	1,180	2,060	1,400	2,300	2,410	1,650
31	.....	8,000	.....	750	.....	1,240	1,550	.....	2,200	.....	1,500

NOTE.—Daily discharge determined from a fairly well-defined discharge rating curve.

Discharge interpolated for days when gage was not read except Mar. 31, Apr. 1, 2, 9, 16, 30, June 14–22, Oct. 8, 29, and Dec. 24, 25, and 31, for which discharge was estimated by means of the discharge at Garvins Falls.

There may have been some ice present during March, but comparisons with the other stations in the Merrimac basin indicate that the discharge during March was not affected.

Monthly discharge of Merrimac River at Franklin Junction, N. H., for 1911.

[Drainage area, 1,460 square miles.]

Month.	Drainage in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	.....	.....	1,420	0.973	1.12	D.
February	.....	.....	1,000	.685	.71	D.
March	8,000	900	1,570	1.08	1.24	C.
April	13,000	2,710	7,110	4.87	5.43	B.
May	14,100	750	4,050	2.77	3.19	B.
June	2,680	1,060	1,590	1.09	1.22	B.
July	1,240	800	965	.661	.76	B.
August	2,060	930	1,090	.747	.86	B.
September	2,090	1,120	1,470	1.01	1.13	B.
October	5,420	1,420	2,750	1.88	2.17	B.
November	3,580	1,980	2,500	1.71	1.91	B.
December	4,400	1,500	2,650	1.82	2.10	B.
The year	14,100	750	2,350	1.61	21.84	

NOTE.—Discharge for the periods during which ice was present estimated from the discharge record at Garvins Falls and on climatologic records.

The accuracy is marked low because there is reason to believe that the daily gage readings by the observer from which the discharge was derived were not good.

MERRIMAC RIVER AT GARVINS FALLS, N. H.

Location.—At the dam of the Manchester Traction, Light & Power Co., 4 miles below Concord, N. H. The Garvins Falls plant is one of a system including three water-power plants and one steam-power plant operated by this company. The Garvins Falls site, one of the best on Merrimac River, has been utilized since 1815, first in connection with Old Bow Canal and later to furnish power for a pulp mill.

Records available.—1904 to 1911.

Drainage area.—2,340 square miles.

Dam.—During 1903–4 an overfall dam of the ogee type, somewhat similar in cross section to the dam at Holyoke, was completed. This dam is 550 feet long between abutments, and about 800 feet over all, including the head gates, and is of stone masonry, substantially built. The new dam and head gates are situated about 800 feet downstream from the old dam, which was destroyed on the completion of the new structure.

Canal and wasteways.—A canal has been completed which is about 500 feet long and 74 feet wide at the water line; in the sides of this canal wasteways are provided, one 90 feet long at elevation 102 feet (the main crest of the dam being taken as elevation 100) and another 45 feet long at elevation 103. A waste gate, 10 feet wide and capable of being lowered to elevation 93, is also provided for use in floating out any obstructions which lodge against the racks.

Turbines.—There are six triplex turbines, of somewhat more than 1,000 horsepower each, and one small duplex turbine of 75 horsepower used in running exciters; each large unit has three 39-inch runners mounted on a horizontal shaft which revolves at 180 revolutions a minute. Two of the wheels in each set discharge through a common T center and draft tube near the fore bay wall. The third wheel is set opposite a quarter turn at the downstream end of the casing and discharges through this quarter turn into a smaller draft tube. The top of the penstock opening is at elevation 95.5; the lower ends of the draft tubes are horizontal and are about 2 feet below the elevation of usual tail water. The gates for the runners are of the plain cylindrical pattern, without fingers, and are controlled by governors. The average head on the wheels is about 29 feet and there are six 650-kilowatt 3-phase generators directly connected with the turbines.

Utilization of power.—The power developed is transmitted at 12,000 volts tension to Manchester, about 14 miles away, where it enters a substation and is transformed to a lower voltage and utilized through a distributing switchboard for light and power.

Computations of discharge.—Careful records of the pond and tail race levels, wheel openings, etc., have been kept by the company since completion of the dam in 1904 and have been furnished for computations of flow by J. Brodie Smith, manager. The original records for 1911 have been furnished by Hollis French and Allen Hubbard, consulting engineers for the power company. By means of these records computations of daily discharge were made by engineers of the United States Geological Survey. A number of current-meter measurements have been made from time to time by engineers of the United States Geological Survey for the purpose of rating turbines and to assist in computing the flow over the dam.

Winter flow.—The flow over the dam is somewhat affected by ice during the winter.

Accuracy.—Conditions at this station favor accurate determinations of discharge.

Daily discharge, in second-feet, of Merrimac River at Garvins Falls, N. H., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,860	1,420	1,290	8,740	13,300	1,600	1,280	2,010	1,970	929	2,760	5,600
2	1,940	1,600	1,370	6,510	13,200	2,150	984	1,610	1,580	2,110	3,090	4,650
3	2,200	1,390	1,450	5,170	14,900	2,690	865	1,270	1,160	2,140	2,970	4,080
4	2,930	1,530	1,300	4,430	9,800	1,200	718	1,220	1,080	2,590	2,650	3,790
5	5,100	1,620	1,200	3,980	7,250	1,700	903	962	1,120	3,450	2,220	4,300
6	4,740	1,210	1,240	4,100	5,760	2,040	778	791	1,480	4,360	2,490	2,750
7	3,600	1,360	1,220	7,250	5,210	2,060	891	1,160	1,500	3,470	2,470	2,740
8	2,660	1,400	1,260	12,000	4,990	2,250	797	1,170	1,960	2,580	3,600	2,630
9	2,590	1,500	1,180	14,400	5,400	2,340	618	1,190	1,650	2,640	4,380	2,260
10	2,520	1,360	1,230	11,700	5,580	2,210	1,010	1,190	1,250	2,210	3,750	2,460
11	2,300	1,390	1,090	9,710	5,100	1,800	972	1,240	1,930	2,340	3,130	2,410
12	2,140	842	705	9,180	4,620	2,300	823	970	1,730	2,270	1,630	2,290
13	1,980	1,520	1,330	8,810	4,670	2,230	1,070	715	1,470	1,920	3,000	2,520
14	2,030	1,250	1,320	10,300	4,530	2,340	1,120	1,150	1,600	1,780	3,750	2,720
15	1,890	1,220	1,650	13,500	3,830	2,590	895	1,240	1,640	1,170	3,770	2,390
16	1,900	1,110	2,640	18,900	3,490	2,780	482	1,230	1,540	1,990	3,490	2,040
17	1,620	1,220	2,020	15,500	3,130	2,170	1,070	1,580	1,620	1,900	3,340	1,370
18	1,490	1,110	1,940	11,900	3,080	1,870	1,080	1,400	2,050	1,870	3,050	2,610
19	1,550	961	1,870	9,910	2,850	2,000	1,200	1,240	1,980	2,770	2,770	2,840
20	1,380	1,530	1,780	9,580	2,730	2,060	1,830	785	1,630	8,500	4,920	2,530
21	1,440	1,230	1,790	10,100	2,500	2,000	1,240	1,040	1,520	6,610	4,420	1,890
22	1,260	1,140	1,770	9,440	2,330	1,830	953	1,260	1,590	4,970	2,930	2,330
23	1,490	1,310	1,800	8,790	2,280	1,800	822	1,150	1,460	4,930	3,510	2,280
24	1,370	1,300	1,720	7,520	2,280	1,540	1,020	1,220	893	6,260	2,250	4,750
25	1,360	996	1,730	8,130	2,140	915	1,190	1,110	1,730	5,200	3,510	3,860
26	1,470	1,020	1,390	10,300	2,340	1,730	1,100	1,170	1,260	4,100	3,400	3,020
27	1,410	1,260	2,160	11,200	2,520	1,650	1,340	454	1,500	3,330	3,390	2,590
28	1,470	1,560	5,160	12,000	2,390	1,450	1,580	964	1,850	2,980	3,290	1,010
29	1,810	.....	7,710	13,600	2,100	1,550	1,560	1,190	2,000	2,780	3,330	301
30	1,910	.....	10,900	14,000	1,860	1,450	1,090	1,680	1,750	3,090	5,920	1,910
31	1,560	.....	10,800	.....	1,920	.....	2,440	3,180	.....	2,890	.....	4,010

Monthly discharge of Merrimac River at Garvins Falls, N. H., for 1911.

[Drainage area, 2,340 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	5,100	1,260	2,100	0.897	1.03
February	1,620	842	1,300	.556	.58
March	10,900	705	2,450	1.05	1.21
April	18,900	3,980	10,000	4.27	4.76
May	14,900	1,860	4,780	2.04	2.35
June	2,780	915	1,940	.829	.92
July	2,440	482	1,090	.466	.54
August	3,180	454	1,240	.530	.61
September	2,050	893	1,580	.675	.75
October	8,500	929	3,230	1.38	1.59
November	5,920	1,630	3,310	1.41	1.57
December	5,600	301	2,800	1.20	1.38
The year	18,900	301	2,990	1.28	17.29

MERRIMAC RIVER AT LAWRENCE, MASS.

Location.—At the dam of the Essex Water Power Co. in Lawrence.

Records available.—Records of flow of the Merrimac at Lawrence have been kept for more than 50 years but have been published only since 1890.

Diversions.—Water is diverted from the drainage basins of Sudbury and Nashua rivers for use by the Metropolitan district in the vicinity of Boston, but during a portion of the year water is wasted into the Merrimac at these diversion dams; consequently the drainage area is somewhat variable.

Drainage area.—

	Square miles.
Total of Merrimac River drainage basin above Lawrence	4,663
Nashua River drainage basin above gaging station at Clinton, Mass	118
Sudbury River drainage basin, Framingham dam No. 1	75
Cochituate River drainage basin	18
Total of Nashua, Sudbury, and Cochituate river drainage basins	211
Net drainage of Merrimac River, excluding Nashua, Sudbury, and Cochituate river basins	4,452

Computations of discharge.—Careful record is kept of the flow over the dam and through the various wheels and gates in connection with the sale of power, and the quantity measured at Lawrence includes the water wasted into the Merrimac from the Sudbury, Nashua, and Cochituate drainage basins. In getting the absolute yield of the river this fact should be considered in reference to the drainage areas, either by deducting it from the Merrimac flow and using the net area and the net flow of the Merrimac, or by getting the total yield of both Sudbury and Nashua rivers with the Merrimac and using the total area. The estimate of the quantity wasted from Sudbury and Nashua drainage basins into the Merrimac is based on data furnished by the Metropolitan Water and Sewerage Board of Boston.

Accuracy.—Such care is taken in procuring the base data used and in making computations that the records are regarded as excellent.

Cooperation.—Records furnished for publication by R. A. Hale, principal assistant engineer of the Essex Water Power Co.

Average weekly discharge, in second-feet, of Merrimac River at Lawrence, Mass., for 1911.

[Weeks arranged in order of dryness at Lawrence.]

Week ending Sunday.	Merrimac River at Lawrence (total drainage area=4,663 square miles).	Wasting into Merrimac River from diverted watersheds (211 square miles).	Net yield of Merrimac River from 4,452 square miles.	
			Per week.	Per square mile.
	Sec.-ft.	*Sec.-ft.*	*Sec.-ft.*	*Sec.-ft.*
July 23	854	6	848	0.190
July 9	985	6	979	.220
Aug. 20	1,211	6	1,205	.271
Aug. 27	1,268	6	1,262	.283
July 30	1,322	6	1,316	.296
Aug. 13	1,409	6	1,403	.315
July 16	1,558	7	1,551	.348
Oct. 1	1,731	4	1,727	.388
Sept. 10	1,811	3	1,808	.406
Sept. 3	1,859	6	1,853	.416
Feb. 19	1,869	8	1,861	.418
Aug. 6	1,881	6	1,875	.421
July 2	1,922	5	1,917	.431
Sept. 17	1,937	6	1,931	.434
Feb. 26	1,940	17	1,923	.432
Jan. 29	1,989	28	1,961	.440
Sept. 24	2,008	4	2,004	.450
June 25	2,097	5	2,092	.470
Jan. 22	2,217	19	2,198	.494
Mar. 12	2,227	9	2,218	.498
Feb. 12	2,411	18	2,393	.538
Feb. 5	2,572	28	2,544	.571
June 4	2,643	6	2,637	.592
June 11	2,655	10	2,645	.594
Oct. 15	2,701	4	2,697	.606
Mar. 5	2,707	14	2,693	.605
Oct. 8	2,835	4	2,831	.636
June 18	2,924	9	2,915	.655
Jan. 15	2,988	36	2,952	.663
May 28	3,250	9	3,241	.728
Nov. 5	3,683	6	3,677	.826
Dec. 10	3,966	15	3,951	.887

Average weekly discharge, in second-feet, of Merrimac River at Lawrence, Mass., for 1911—Continued.

Week ending Sunday.	Merrimac River at Lawrence (total drainage area=4,663 square miles).	Wasting into Merrimac River from diverted watersheds (211 square miles).	Net yield of Merrimac River from 4,452 square miles.	
			Per week.	Per square mile.
	Sec.-ft.	*Sec.-ft.*	*Sec.-ft.*	*Sec.-ft.*
May 21	4,124	7	4,117	0.925
Nov. 12	4,132	5	4,127	.927
Jan. 8	4,159	62	4,097	.920
Mar. 26	4,548	29	4,519	1.015
Dec. 17	4,643	20	4,623	1.038
Nov. 19	4,857	20	4,837	1.086
Oct. 22	4,869	6	4,863	1.092
Dec. 3	5,541	31	5,510	1.238
Nov. 26	5,770	32	5,738	1.289
Dec. 24	5,871	48	5,823	1.308
Mar. 19	6,049	73	5,976	1.342
May 14	6,162	9	6,153	1.382
Oct. 29	6,432	9	6,423	1.443
Dec. 31	8,378	57	8,321	1.869
May 7	11,904	9	11,895	2.672
Apr. 9	11,947	61	11,886	2.670
Apr. 30	12,363	23	12,340	2.772
Apr. 23	14,164	18	14,146	3.177
Apr. 2	14,205	22	14,183	3.186
Apr. 16	15,657	43	15,614	3.507
Total, 52 weeks	225,205	906	224,299	50.380
Weekly average	4,331	17	4,314	.969

Daily discharge, in second-feet, of Merrimac River at Lawrence, Mass., for 1911.

Day of month.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	a 560	3,178	3,445	16,615	15,424	3,231	1,414	2,268	2,798	*a 116*	4,008	7,756
2	3,460	2,952	3,442	a12,196	14,811	2,860	a 497	*2,460*	1,792	2,420	3,836	5,789
3	3,210	2,552	3,192	10,369	*15,431*	1,717	894	2,458	a1,361	2,685	3,703	a 4,769
4	4,127	1,453	1,982	8,330	13,484	a 782	117	2,282	1,376	2,747	2,829	5,886
5	4,817	a 670	a 658	*7,547*	10,063	3,312	1,401	1,559	*3,299*	2,695	*a 2,452*	4,860
6	*5,819*	3,461	3,314	7,673	7,667	3,105	1,891	a 186	2,328	3,611	4,466	3,853
7	4,356	3,311	2,809	12,968	a 6,445	2,922	1,456	1,642	2,170	3,374	3,662	4,005
8	a3,321	2,967	2,520	17,999	7,238	2,880	925	1,611	2,103	a 2,314	3,843	4,046
9	4,831	2,705	2,513	a18,741	6,306	2,863	a 208	1,746	1,289	4,529	4,844	*2,513*
10	3,829	2,642	2,483	18,171	6,553	1,907	*2,627*	1,749	*a 115*	3,259	5,344	a 2,596
11	3,312	1,614	1,531	15,788	6,605	a1,593	2,222	1,908	1,876	3,080	3,650	4,944
12	3,107	a 177	*a 416*	14,138	6,220	3,581	1,921	1,156	2,356	1,349	a3,118	4,236
13	3,196	2,447	2,536	13,179	4,965	3,132	1,740	*a 51*	2,478	4,304	5,282	3,953
14	2,014	2,233	2,696	13,513	a 5,247	2,983	1,354	1,285	2,651	2,130	4,060	4,773
15	a 629	2,237	5,704	15,624	6,507	4,087	931	1,156	2,568	a 259	4,603	5,832
16	3,625	2,310	12,451	a19,189	5,325	*4,551*	a 114	1,552	1,449	2,964	5,352	4,402
17	2,955	2,276	8,511	*20,369*	4,565	1,763	1,345	1,543	a 182	2,781	5,121	a 4,362
18	2,500	1,402	5,403	16,707	3,702	a 369	928	1,598	2,595	2,540	4,486	6,637
19	2,437	a 181	a5,041	13,561	3,864	2,519	851	1,138	2,887	2,813	a 5,092	5,999
20	2,274	2,437	6,414	12,687	2,367	2,722	964	a 206	2,618	6,325	*7,476*	5,325
21	1,558	2,419	4,626	12,610	a 2,539	2,615	987	1,577	2,330	*9,256*	6,889	4,664
22	*a 173*	2,385	4,858	12,132	4,713	2,510	804	1,729	2,187	a 7,407	6,181	4,298
23	1,977	2,342	4,883	a11,085	3,323	2,346	*a 98*	1,687	1,274	8,308	5,539	3,971
24	2,319	2,306	5,023	10,978	3,144	1,622	1,296	1,316	a 164	8,166	5,085	a 10,202
25	2,264	1,539	2,973	9,992	3,036	*a 343*	1,441	1,423	1,831	8,256	4,377	*13,931*
26	2,283	*a 155*	a3,058	11,277	3,261	2,437	1,700	976	2,108	6,747	a 4,840	11,878
27	2,195	2,606	5,637	12,340	*2,160*	2,555	1,413	a 168	2,219	5,685	6,285	9,583
28	1,807	*3,622*	10,595	13,568	a 3,110	2,296	1,897	1,538	2,262	4,461	5,388	8,675
29	a1,081	.....	15,824	14,125	3,259	2,294	1,306	1,719	2,162	a 3,404	4,895	6,260
30	3,738	.....	17,649	a14,262	2,297	1,961	a 200	1,850	1,421	5,057	3,902	4,608
31	3,460	.....	*20,918*	.....	4,354	.....	1,954	1,952	.....	3,895	.....	a 3,709

a Sunday.

NOTE.—Maximum and minimum appear in italics.

Monthly discharge of Merrimac River at Lawrence, Mass., for 1911.

Month.	Mean discharge of Merrimac River at Lawrence as measured (total drainage area, 4,663 square miles).	Wasting into Merrimac River from diverted watersheds (211 square miles).	Average yield of Merrimac River from watershed of 4,452 square miles.		Run-off (depth in inches on drainage area).
			Mean discharge.	Per square mile.	
	Sec.-ft.	*Sec.-ft.*	*Sec.-ft.*	*Sec.-ft.*	
January	2,814	36	2,778	0.624	0.72
February	2,164	17	2,147	.482	.50
March	5,584	30	5,554	1.248	1.44
April	13,591	34	13,557	3.045	3.39
May	6,064	9	6,055	1.360	1.57
June	2,462	7	2,455	.551	.61
July	1,190	6	1,184	.266	.31
August	1,467	6	1,461	.328	.38
September	1,942	5	1,937	.435	.49
October	4,095	6	4,089	.918	1.06
November	4,687	19	4,668	1.049	1.17
December	5,752	34	5,718	1.284	1.48
The year	4,318	17	4,301	.966	13.12

LAKE WINNEPESAUKEE AT LAKEPORT, N. H.

The following table, taken from the lake company's gage books, shows the height of water in inches above low-water mark at Lakeport, N. H., on the first day of every month from the year 1860 to the present time, also the precipitation for each year. "0" denotes low water. "44" denotes full lake. "F" lake was full that year. "N" not full.

Gage height, in inches, of Lake Winnepesaukee at Lakeport, N. H., from 1860 to 1911.

[Compiled by Harry W. Daniell, agent for Winnepesaukee Lake Cotton & Woolen Co., and furnished through the courtesy of Mr. A. F. Safford.]

	Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Precipitation.
N	1860	14	11	12	24	29	28	29	26	24	21	20	20	36.40
N	1861	35	29	23	36	40	35	34	34	29	26	26	30	42.56
N	1862	29	25	24	23	40	40	42	39	34	31	26	32	43.51
N	1863	33	36	36	36	42	40	38	41	38	33	34	38	48.31
N	1864	37	34	29	36	40	36	32	23	20	13	11	17	36.49
N	1865	23	26	24	37	38	40	38	35	18	3	0	1	41.44
N	1866	3	2	14	23	31	34	38	34	26	26	22	23	39.70
F	1867	27	25	30	30	43	42	42	37	43	34	31	29	39.22
F	1868	28	23	14	25	36	44	41	36	32	40	37	40	41.54
N	1869	36	35	34	27	40	42	43	40	32	25	37	39	46.61
F	1870	43	38	37	36	44	42	39	30	20	1	0	1	38.98
N	1871	− 2	− 5	− 2	14	22	31	27	26	21	15	14	16	40.34
F	1872	21	21	15	12	32	38	42	37	38	43	41	40	48.19
F	1873	39	35	26	22	40	42	38	37	27	21	29	30	43.16
F	1874	35	37	36	34	39	44	43	43	36	31	23	16	43.65
N	1875	7	3	0	4	30	38	40	36	37	24	27	31	44.04
F	1876	33	38	37	36	43	44	42	38	22	17	6	6	44.92
N	1877	3	− 9	− 9	13	28	30	29	28	27	14	21	35	40.21
F	1878	39	40	34	39	44	43	43	38	34	24	19	22	45.42
F	1879	37	34	33	33	42	43	44	40	35	31	18	17	41.88
F	1880	22	28	34	39	44	44	40	33	19	11	7	6	38.31
N	1881	3	− 6	2	14	27	38	37	37	31	22	16	18	45.03
F	1882	29	33	36	36	43	44	43	36	18	19	8	2	36.96
N	1883	0	− 4	− 4	− 6	16	20	23	22	15	10	8	8	36.65
F	1884	11	14	22	38	44	44	44	36	29	14	7	5	41.19
N	1885	8	14	17	16	37	38	38	36	36	28	24	28	43.95
F	1886	31	37	41	40	41	43	41	37	29	24	18	22	45.30

Gage height, in inches, of Lake Winnepesaukee at Lakeport, N. H., from 1860 to 1911— Continued.

	Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Precipitation.
F	1887	27	32	33	26	44	44	44	44	40	33	25	24	45.53
F	1888	29	30	30	37	44	43	43	36	31	34	40	44	55.60
N	1889	43	35	33	38	41	41	40	37	30	26	26	30	44.25
F	1890	41	41	41	43	41	44	43	40	36	40	41	38	53.12
F	1891	35	42	35	43	39	41	39	33	30	21	14	10	42.02
N	1892	12	22	22	21	24	34	38	34	37	32	24	29	41.99
F	1893	26	26	27	30	44	44	40	32	28	20	20	18	43.00
F	1894	22	22	21	33	39	42	43	38	29	24	17	12	31.46
N	1895	10	10	6	7	35	35	34	30	25	19	13	19	39.64
F	1896	24	25	39	35	44	44	42	36	29	26	26	31	43.25
F	1897	30	33	33	37	44	44	44	44	40	32	25	26	49.69
F	1898	34	30	36	43	44	44	44	39	31	25	23	27	46.47
F	1899	31	34	34	34	43	44	40	37	29	22	15	9	34.07
F	1900	5	6	25	32	44	44	42	36	30	23	18	18	50.95
F	1901	20	17	13	20	44	44	44	44	44	37	33	26	48.09
F	1902	35	37	37	43	44	44	44	44	43	41	42	40	51.77
F	1903	44	37	34	43	44	38	44	41	37	29	23	17	41.55
F	1904	15	14	10	18	43	44	44	40	35	32	26	21	39.02
N	1905	17	17	14	24	33	32	30	27	33	29	23	21	38.38
F	1906	24	29	29	31	44	44	44	44	34	25	20	14	37.61
N	1907	11	9	6	12	25	27	26	20	13	14	14	22	40.77
F	1908	27	29	32	39	44	44	42	37	29	20	10	3	32.09
N	1909	0	2	7	13	35	39	38	34	24	18	8	3	37.14
N	1910	0	0	2	12	22	23	20	11	5	3	− 5	− 9	33.73
N	1911	− 9½	−11¼	−10	− 5½	13½	14¼	13½	10½	6¾	4¾	4¼	6	35.66

SOUHEGAN RIVER AT MERRIMAC, N. H.

Location.—Just above Atherton Falls, about 1½ miles above tbe dam of the W. H. McElwain Co., below the mouth of Stony Branch, and just above the junction of the Souhegan with the Merrimac.

Records available.—July 13, 1909, to Dec. 31, 1911.

Drainage area.—168 square miles.

Gages.—Vertical staff on the left bank 40 feet above the falls; chain gage attached to a tree about 300 feet upstream from the staff gage. All published records are referred to the staff gage.

Channel.—One at all stages. Not liable to shift.

Discharge measurements.—At high stages from bridges above and below the station; at low stages by wading at a section below the gage.

Artificial control.—Flow affected by the operation of mills at Milford, about 8 to 10 miles above, which causes a few hundredths of a foot difference between the morning and afternoon readings. In determining the daily discharge, it is assumed that the average of these readings gives essentially the true 24-hour mean. No information is available regarding night storage at Milford.

Winter flow.—The comparatively sharp-crested control at the head of the falls immediately below the gage remains relatively free from ice during the winter; hence the relation of gage height to discharge is not greatly affected by ice.

Accuracy.—Discharge rating curve quite well developed.

Cooperation.—Established in cooperation with the W. H. McElwain Co.

Daily gage height, in feet, of Souhegan River at Merrimac, N. H., for 1911.

[R. J. Sylvester, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.54	2.59	3.28	4.10	3.11	2.39	2.33	2.43	2.65	2.29	2.97	3.19
2	2.66	2.60	2.99	3.22	3.11	2.45	2.41	2.35	2.66	2.32	3.00	3.17
3	3.36	2.47	2.62	3.06	3.15	2.52	2.42	2.29	2.50	2.55	2.95	3.21
4	3.90	2.40	2.52	3.14	3.11	2.37	2.30	2.35	2.40	2.59	2.93	3.18
5	3.22	2.46	2.52	3.02	3.06	2.33	2.17	2.30	2.23	2.66	2.90	3.18
6	2.95	2.54	2.48	3.19	2.97	2.35	2.17	2.27	2.43	2.71	2.89	3.01
7	2.90	2.50	2.44	5.80	2.77	2.99	2.19	2.17	2.40	2.67	3.09	3.04
8	2.90	2.52	2.46	4.80	2.76	3.50	2.15	2.15	2.33	2.70	3.17	2.93
9	.....	2.42	2.42	3.95	2.75	2.95	2.15	2.14	2.37	2.73	3.23	3.21
10	2.58	2.49	2.50	3.60	2.77	2.71	2.15	2.13	2.43	2.70	3.15	2.88
11	2.57	2.50	2.50	3.70	2.77	2.55	2.14	2.11	2.23	2.67	3.07	2.85
12	2.60	2.49	2.51	3.55	2.74	2.55	2.11	2.10	2.50	2.67	2.96	2.94
13	2.52	2.57	2.53	3.80	2.65	3.11	2.07	2.05	2.33	2.51	2.93	2.97
14	2.53	2.40	2.65	3.85	2.72	3.35	2.03	2.05	2.25	2.51	3.07	2.94
15	2.50	2.33	3.50	4.25	2.73	3.30	1.99	2.01	2.45	2.29	3.09	2.95
16	2.42	2.34	4.90	4.15	2.65	2.99	1.93	2.00	2.37	2.27	3.44	3.07
17	2.34	2.42	3.55	3.80	2.61	2.55	2.04	2.01	2.33	1.92	3.35	3.55
18	2.30	2.42	3.35	3.65	2.59	2.67	2.03	2.01	2.25	2.53	3.35	4.10
19	2.34	2.48	3.34	3.47	2.55	2.67	2.03	1.99	2.35	4.00	4.20	3.55
20	2.32	2.46	2.96	3.45	2.72	2.65	2.03	1.97	2.33	4.60	3.80	3.50
21	2.39	2.41	3.31	3.42	2.51	2.51	2.03	1.99	2.36	3.75	3.55	3.23
22	2.28	2.42	3.29	3.39	2.53	2.47	2.02	2.02	2.32	3.95	3.43	3.21
23	2.28	2.36	3.55	3.16	2.43	2.43	2.04	1.99	2.34	4.35	3.24	3.17
24	2.30	2.41	3.50	3.23	2.53	2.44	1.99	2.19	2.27	4.15	3.27	5.20
25	2.28	2.38	2.85	3.19	2.60	2.43	2.07	2.17	2.22	3.55	3.31	4.25
26	2.28	2.40	2.51	3.13	2.87	2.45	2.01	2.23	2.11	3.33	3.37	4.05
27	2.58	2.60	3.44	3.15	2.85	2.35	2.01	2.17	2.09	3.24	.....	3.95
28	3.42	3.31	6.50	3.05	2.61	2.26	2.09	2.27	2.16	3.13	3.35	3.80
29	3.32	.....	5.10	2.99	2.61	2.35	2.21	2.36	2.24	3.10	3.37	3.44
30	2.96	.....	5.40	3.03	2.49	2.34	2.47	2.50	2.28	3.05	3.29	3.65
31	2.66	.....	5.10	.....	2.46	.....	2.43	2.60	.....	2.99	.....	.....

NOTE.—Gage heights at this station may be somewhat in error as a result of mill control at Milford, about 8 or 10 miles upstream. Ice existed from Jan. 1 to about Mar. 15 and Dec. 30 and 31. It is not known whether gage heights were to water surface or to the top of the ice.

Readings were made on the staff gage from Jan. 1 to Apr. 11. From Apr. 12 to Dec. 31 they were made with the chain gage, which is located about 300 feet upstream from the staff gage. Gage readings for the latter period were reduced to the staff-gage datum by correction for difference in datum and slope between the two gages. Since both gages are located in a long deep pool, the slope is very slight, being only 0.03 foot at a gage height of about 3.5 feet, and probably remaining nearly constant at all stages.

Daily discharge, in second-feet, of Souhegan River at Merrimac, N. H., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	80	85	290	770	273	62	54	70	118	48	219	307
2	105	85	160	320	273	74	66	56	121	52	230	298
3	360	60	70	253	290	87	68	48	83	94	212	315
4	625	50	55	286	273	60	49	56	64	103	205	303
5	300	60	50	238	253	54	34	49	41	121	194	303
6	190	50	45	307	219	56	34	45	70	134	191	234
7	175	40	40	2,040	152	226	36	34	64	123	265	246
8	160	45	40	1,240	149	447	32	32	54	131	298	205
9	120	35	35	682	146	212	32	32	60	140	324	315
10	80	40	50	496	152	134	32	31	70	131	290	187
11	80	40	50	546	152	94	32	29	41	123	257	178
12	85	40	55	472	143	94	29	28	83	123	216	208
13	65	40	60	599	118	273	26	24	54	85	205	219
14	65	35	90	626	137	378	23	24	43	85	257	208
15	60	30	425	862	140	355	20	22	74	48	265	212
16	50	25	1,320	800	118	226	17	21	60	45	419	257
17	40	35	472	599	108	94	24	22	54	16	378	472
18	35	35	378	521	103	123	23	22	43	90	378	770
19	35	35	373	433	94	123	23	20	56	710	830	472
20	35	30	216	424	137	118	23	19	54	1,100	599	447

Daily discharge, in second-feet, of Souhegan River at Merrimac, N. H., for 1911—Contd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
21	45	30	360	409	85	85	23	20	58	572	472	324
22	35	25	351	396	90	77	22	22	52	682	414	315
23	30	25	472	294	70	70	24	20	55	928	329	298
24	30	25	447	324	90	72	20	36	45	800	342	1,550
25	35	25	178	307	105	70	26	34	39	472	360	862
26	35	25	85	282	184	74	22	41	29	368	386	740
27	85	75	419	290	178	56	22	34	27	329	382	682
28	370	300	2,670	250	108	44	27	45	33	282	378	599
29	330	.....	1,470	226	108	56	38	58	42	269	386	419
30	180	.....	1,710	242	81	55	77	83	47	250	351	350
31	100	.....	1,470	.....	75	.....	70	105	.....	226	.....	300

NOTE.—Discharge during the open-water periods determined from a well-defined discharge rating curve. Discharge Jan. 1 to Mar. 15 has been corrected by discharges equivalent to a gage-height difference of from 0.05 to 0.3 foot. Use has also been made of climatologic records in making these corrections. Discharge Jan. 9 and Nov. 27 interpolated. Discharge Dec. 30 and 31 estimated.

Monthly discharge of Souhegan River at Merrimac, N. H., for 1911.

[Drainage area, 168 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	.....	.....	130	0.774	0.89	C.
February	.....	.....	50.9	.303	.34	C.
March	.....	.....	449	2.67	3.08	B.
April	2,040	226	518	3.08	3.44	A.
May	290	70	149	.887	1.02	A.
June	447	44	132	.786	.88	A.
July	77	17	33.8	.201	.23	B.
August	105	19	38.1	.227	.26	B.
September	121	27	57.8	.344	.38	B.
October	1,100	16	280	1.67	1.92	A.
November	830	191	334	1.99	2.22	A.
December	1,550	178	406	2.42	2.79	A.
The year	.....	.....	216	1.29	17.45	

SOUTH BRANCH OF NASHUA RIVER (WACHUSETT DRAINAGE AREA) AT CLINTON, MASS.

Location.—At Clinton, Mass.

Records available.—July, 1896, to December, 1911.

Drainage area.—118.19 square miles.

Computations of discharge.—A large reservoir, storing about 8,500,000,000 cubic feet, was constructed at Clinton, Mass., and has stored water since 1903. Beginning with 1897 the estimates of discharge have been corrected for gain and loss of storage in reservoirs and mill ponds, so that the results show the natural flow of the stream.

The yield reported per square mile is the yield of the drainage area, including the water surfaces. In the Wachusett basin this water surface from the years 1897 to 1902, inclusive, amounted to 2.2 per cent of the whole area; in 1903, 2.4 per cent; in 1904, 3.6 per cent; in 1905, 4.1 per cent; in 1906, 5.1 per cent; in 1907, 6.0 per cent; and in 1908 and subsequent years, 7.0 per cent.

The accompanying tables give data on discharge and precipitation for 1910, also the average for the years 1897–1910, inclusive, precipitation averages being based on records at several stations in the Nashua drainage basin.

Cooperation.—Measurements are made and results are furnished by the Metropolitan Water and Sewerage Board, Dexter Brackett, chief engineer.

Yield and rainfall in South Branch of Nashua River basin (Wachusett drainage area) at Clinton, Mass., for 1911, and summaries for 1897–1911.

[Drainage area, 118.19 square miles.]

Month.	Total yield, in million gallons.	Average yield per square mile.		Rainfall, in inches.[a]	Rainfall collected	
		Million gallons per day.	Second-feet.		Inches.[a]	Per cent.
1911.						
January	2,832.6	0.773	1.196	2.91	1.379	47.5
February	2,067.6	.625	.967	2.43	1.007	41.4
March	4,907.6	1.339	2.072	3.79	2.389	63.0
April	4,938.2	1.393	2.155	2.22	2.404	108.5
May	1,687.7	.461	.713	1.59	.822	51.6
June	1,244.3	.351	.543	2.37	.606	25.5
July	207.0	.057	.087	2.53	.101	4.0
August	689.1	.188	.291	5.46	.335	6.1
September	643.2	.181	.281	3.04	.313	10.3
October	2,629.5	.718	1.111	5.24	1.280	24.4
November	3,668.3	1.035	1.601	4.14	1.786	43.1
December	3,908.0	1.067	1.650	3.01	1.903	63.2
The year	29,423.1	.682	1.055	38.73	14.325	37.0

SUMMARY.

1897–1911.						
January	66,580.9	1.212	1.874	3.74	2.161	57.7
February	71,332.4	1.430	2.213	3.90	2.315	59.4
March	147,836.7	2.690	4.162	4.22	4.799	113.8
April	114,391.3	2.151	3.327	3.86	3.713	96.1
May	63,249.8	1.151	1.781	3.31	2.053	62.0
June	43,059.1	.810	1.253	4.04	1.398	34.6
July	22,846.5	.416	.643	4.11	.741	18.1
August	23,084.2	.420	.650	4.31	.749	17.4
September	20,559.8	.387	.598	3.87	.667	17.2
October	30,138.7	.548	.848	3.46	.978	28.2
November	44,301.0	.833	1.289	3.45	1.438	41.7
December	69,231.9	1.260	1.949	4.26	2.247	52.8
The year	716,612.3	1.107	1.713	46.53	23.259	50.0

[a] For 1911, total for month; 1897–1911, average of totals per calendar month.

SUDBURY RIVER AT FRAMINGHAM AND LAKE COCHITUATE AT COCHITUATE, MASS.

Location.—On Sudbury River at Framingham and on Lake Cochituate at Cochituate.

Records available.—Sudbury River and Lake Cochituate have been studied by the engineers of the city of Boston, the State Board of Health of Massachusetts, and the Metropolitan Water and Sewerage Board; records of rainfall have been kept in the Sudbury basin since 1875, and in the Cochituate basin since 1852, but the latter are considered of doubtful accuracy previous to 1872.

Storage reservoirs.—Storage reservoirs have been constructed by the city of Boston and the Metropolitan Water and Sewerage Board controlling the greater part of the flow from these basins. Lake Cochituate, which drains into Sudbury River a short distance below Framingham, is controlled as a storage reservoir by the Metropolitan Waterworks. In the Sudbury River basin the water surfaces exposed by evaporation have been increased from time to time by the construction of additional storage reservoirs. From 1875 to 1878, inclusive, the water surface amounted to 1.9 per cent of the total area; from 1879 to 1884, to 3.0 per cent; 1885 to 1893, to 3.4 per cent; 1894 to 1897, to 3.9 per cent; 1898 and subsequent years, 6.5 per cent.

Determinations of discharge.—The recorded yields of both the Sudbury and Cochituate drainage areas are somewhat affected by the fact that the towns of Framingham, Natick, and Westboro draw public water supplies from within the basins and discharge the sewerage outside. Although the quantities diverted are taken into consideration in determining the run-off, the results are probably less accurate since the sewage diversion works were constructed.

The public water and sewerage works were installed in these towns as follows:

	Water supply.	Sewerage works.
Framingham	1885	1889
Natick	1874	1896
Westboro	1879	1892

All the water drawn from the Wachusett drainage area is passed through the reservoirs in the Sudbury basin, and as the measurement of these quantities must be used in determining the yield of the Sudbury basin, the unavoidable small percentages of error in the measurement of large quantities of water render less accurate the figures giving yields of the Sudbury water supply during months of low yield for years subsequent to 1897.

Cooperation.—Tables of discharge and precipitation are furnished by Dexter Brackett, chief engineer of the Metropolitan Waterworks.

Yield and rainfall in Sudbury River basin at Framingham, Mass., for 1911, and summaries for 1875–1911.

[Drainage area 75.2 square miles.]

Month.	Total yield, in million gallons.	Average yield per square mile.		Rainfall, in inches.[a]	Rainfall collected.	
		Million gallons per day.	Second-feet.		Inches.[a]	Per cent.
1911						
January	1,209.1	0.519	0.802	2.88	0.925	32.1
February	1,474.8	.700	1.084	2.77	1.128	40.7
March	2,667.9	1.144	1.771	3.59	2.042	56.9
April	3,216.3	1.426	2.206	2.81	2.462	87.4
May	740.9	.318	.492	1.01	.567	56.1
June	480.1	.213	.329	2.53	.367	14.5
July	−33.3	−.014	−.022	3.19	−.025	−.8
August	47.5	.020	.032	4.94	.036	.7
September	170.5	.076	.117	2.75	.130	4.8
October	690.1	.296	.458	3.69	.528	14.3
November	1,338.6	.593	.918	4.62	1.024	22.2
December	2,117.4	.908	1.405	3.60	1.626	45.0
The year	14,119.9	.514	.796	38.38	10.804	28.2

SUMMARY.

1875–1911.						
January	104,249.0	1.209	1.870	4.14	2.156	52.1
February	136,248.9	1.735	2.685	4.21	2.818	67.0
March	240,686.0	2.791	4.317	4.37	4.978	113.9
April	166,045.5	1.989	3.078	3.50	3.434	98.2
May	91,221.8	1.058	1.636	3.27	1.887	57.6
June	42,316.8	.507	.784	3.13	.875	27.9
July	14,287.7	.166	.256	3.55	.295	8.3
August	20,793.1	.241	.373	3.88	.430	11.1
September	20,525.5	.246	.380	3.50	.424	12.1
October	38,753.5	.449	.695	3.92	.801	20.4
November	67,085.6	.804	1.243	3.86	1.387	36.0
December	87,599.3	1.016	1.571	3.80	1.812	47.6
The year	1,029,812.7	1.013	1.568	45.13	21.297	47.2

[a] For 1911, total for month; 1875–1911, average of totals for calendar month.

Yield and rainfall in Lake Cochituate basin at Cochituate, Mass., for 1911, and summaries for 1863–1911.

[Drainage area, 17.67 square miles in January, 17.58 square miles after January.]

Month.	Total yield in million gallons.	Average yield per square mile.		Rainfall in inches. [a]	Rainfall collected.	
		Million gallons per day.	Second-feet.		Inches. [a]	Per cent.
1911.						
January	272.0	0.497	0.768	2.74	0.89	32.3
February	373.3	.758	1.173	3.20	1.22	38.2
March	611.6	1.122	1.736	3.31	2.00	60.5
April	662.4	1.256	1.943	2.73	2.17	79.4
May	88.3	.162	.251	.65	.29	44.5
June	39.7	.075	.116	2.53	.13	5.1
July	18.3	.034	.052	3.42	.06	1.8
August	171.4	.315	.487	4.82	.56	11.6
September	187.2	.355	.549	2.96	.61	20.7
October	276.8	.508	.786	3.53	.91	25.7
November	364.0	.690	1.068	4.28	1.19	27.8
December	548.5	1.006	1.557	3.74	1.79	46.4
The year	3,613.5	0.563	0.871	37.91	11.82	31.2

SUMMARY.

1863–1911.						
January	29,655.9	1.105	1.709	3.92	1.97	50.2
February	37,359.4	1.537	2.377	3.97	2.50	62.9
March	57,269.1	2.144	3.317	4.29	3.83	89.2
April	42,981.2	1.663	2.573	3.59	2.87	79.9
May	25,134.4	.941	1.456	3.58	1.68	46.9
June	11,853.8	.459	.710	3.05	.79	26.0
July	7,411.9	.278	.429	3.93	.49	12.6
August	10,610.0	.397	.615	4.18	.71	17.0
September	10,814.0	.419	.647	3.58	.72	20.2
October	14,545.0	.545	.843	4.13	.97	23.5
November	20,165.0	.780	1.207	4.05	1.35	33.3
December	24,712.8	.925	1.432	3.56	1.65	48.0
The year	292,512.5	0.929	1.438	45.83	19.53	42.6

[a] For 1911, total for month; 1863–1911, average of totals per calendar month.

BLACKSTONE RIVER BASIN.

BRANCH RIVER AT BRANCH VILLAGE, R. I.

Location.—At Branch Village, just below the mill of James Pitts & Son, three-quarters of a mile from Forestdale and about 2 miles from Woonsocket.

Records available.—September 2 to December 31, 1909.

Drainage area.—93 square miles.

Gages.—Staff, bolted to a ledge about 500 feet below the dam and mill; also a chain gage attached to a tree on top of the ledge. Gage heights referred to the staff gage.

Channel.—Fairly favorable for accurate measurements.

Discharge measurements.—At low and medium stages made by wading; at high stages from the bridge above the dam or from a boat.

Artificial control.—Gage heights are affected by the mill control directly above the station and also by one farther up the river. The available storage above the Pitts Mill is small and water passes over the dam much of the time.

Winter flow.—Relation between the gage heights and discharge affected by ice only in severe weather.

Accuracy.—Accurate computation of the diurnal fluctuation of discharge caused by the operation of the mills above the station has been rendered impossible by insufficient funds. It is proposed to install an automatic gage to determine the relation between the daily gage heights heretofore recorded and the true mean gage heights, thus making possible the publication of accurate computations of daily discharge from the inception of the station to date. The gage heights for 1911 are withheld pending this investigation, as no gage heights recorded at this station are true indexes of the daily discharge.

Cooperation.—Established and maintained in cooperation with the Natural Resources Survey of the State of Rhode Island.

WOONASQUATUCKET RIVER BASIN.

WOONASQUATUCKET RIVER AT OLNEYVILLE, R. I.

Location.—At the dam at Olneyville near Providence, R. I., in the yards of the Atlantic Mills Co.

Records available.—March 16, 1910, to December 31, 1911.

Gage.—Staff, bolted to the right abutment of the dam; an auxiliary staff gage is nailed to a tree on the right bank in the rips about one-half mile above the dam.

Discharge measurements.—No measurements have been made at this station.

Artificial control.—The water is not used for power development at the Atlantic Mills, but more or less is diverted for use in engine boilers and for other industrial purposes. It is not known whether mills farther up on the river affect the accuracy of the daily gage heights.

Accuracy.—Accurate computation of the diurnal fluctuation of discharge caused by the operation of the mills above the station has been rendered impossible by insufficient funds. It is proposed to install an automatic gage to determine the relation between the daily gage heights heretofore recorded and the true mean gage heights, thus making possible the publication of accurate computations of daily discharge from the inception of the station to date. The gage heights for 1911 are withheld pending this investigation, as no gage heights recorded at this station are true indexes of the daily discharge.

Cooperation.—Station maintained in cooperation with the Atlantic Mills Co., by which the observations are taken.

PAWTUXET RIVER BASIN.

PAWTUXET RIVER AT HARRIS, R. I.

Location.—At the highway bridge near the Harris railroad station, 6 miles below the junction of Moswassecut and Ponaganaset rivers, and 1⅛ miles above the mouth of the South Branch, which enters from the left.

Records available.—August 12, 1909, to December 31, 1909. Station discontinued June 30, 1911.

Gage.—Chain; datum unchanged.

Channel.—Gravel; has not shifted.

Discharge measurements.—Made from the highway bridge.

Artificial control.—The station is located between two mills, each about 2,000 feet distant. When the lower mill is running no backwater exists at the bridge; when it is shut down backwater is caused. When neither mill is running the flow past the gage is simply leakage from the upper dam unless water is flowing over the lower dam. The flow through the wheels at the mill above the stations does not vary materially through the day except at extreme low stages, when the amount of water is insufficient to run the mills the entire day.

Accuracy.—Accurate computation of the diurnal fluctuation of discharge caused by the operation of the mills above the station has been rendered impossible by insufficient funds. It is proposed to install an automatic gage to determine the relation between the daily gage heights heretofore recorded and the true mean gage heights, thus making possible the publication of accurate computations of daily discharge from the inception of the station to date. The gage heights for 1911 are withheld pending this investigation, as no gage heights recorded at this station are true indexes of the daily discharge.

Cooperation.—Established by the United States Geological Survey in cooperation with the Natural Resources Survey of the State of Rhode Island.

CONNECTICUT RIVER BASIN.

CONNECTICUT RIVER AT ORFORD, N. H.

Location.—At covered highway bridge between Orford, N. H. and Fairlee, Vt. Approximately 10 miles downstream (by river) from the mouth of Waits River.

Records available.—August 6, 1900, to December 31, 1911.

Drainage area.—3,300 square miles.

Gage.—Chain attached to the bridge; read once daily; datum unchanged.

Channel.—Wide and deep; gravelly bottom; subject to change.

Discharge measurements.—Made from the downstream side of the bridge by working through the open space near roof.

Artificial control.—There are numerous power plants on the tributaries of the Connecticut River and also on the main stream above the station which have a slight effect on the variation of the daily discharge. The nearest dam downstream is at Wilder, 18 miles below the station. Backwater from this dam is believed to reach within a few miles of Orford.

Winter flow.—The relation of daily gage height to discharge is affected by ice during the winter months, usually from the first part of December to the last part of March and sometimes well into April.

Accuracy.—Discharge rating curve fairly well defined. Open-water estimates considered fairly good. The upper part of the rating curve is defined by measurements made by the vertical velocity curve method and is considered stable. Frequent changes in the lower part of the curve have been necessitated during recent years by changes in the relation of gage height to discharge. Numerous measurements made under ice cover have defined fairly good rating curves for use in the periods during which ice existed. Owing to the smooth ice cover which forms at this station each year and the freedom from ice jams or needle ice, curves developed in earlier years are considered fairly good indexes of discharge in later years.

Cooperation.—Station maintained in cooperation with several New England power companies, which pay for daily gage readings.

Discharge measurements of Connecticut River at Orford, N. H., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Apr. 29	Covert and De Golyer	18.75	24,100
June 22	G. H. Canfield	4.82	2,280

Daily gage height, in feet, of Connecticut River at Orford, N. H., for 1911.

[F. H. Gardner, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.8	.....	.....	10.7	21.9	5.3	3.7	4.5	6.5	5.9	6.4	10.6
2	.....	.....	.....	9.8	22.7	5.4	3.5	4.6	5.3	6.0	6.3	10.1
3	.....	.....	.....	9.5	23.6	5.6	3.2	3.9	4.5	6.1	6.6	8.9
4	.....	.....	.....	8.8	22.5	6.3	3.1	3.8	4.5	5.9	6.4	7.8
5	.....	5.7	5.2	8.7	22.2	5.8	3.4	3.5	4.3	6.4	6.0	7.9
6	.....	.....	.....	8.9	17.5	5.3	3.3	3.5	4.5	7.1	5.8	8.2
7	.....	.....	.....	11.4	14.5	5.2	3.0	3.4	4.5	8.3	5.9	8.3
8	8.1	.....	.....	17.7	12.2	6.9	2.9	3.2	5.1	8.2	6.5	7.8
9	.....	.....	.....	16.6	12.7	5.4	2.9	3.0	5.4	7.5	6.7	8.0
10	.....	.....	.....	16.6	12.5	4.2	3.0	3.0	5.7	6.7	6.5	8.1
11	.....	.....	.....	15.7	11.5	4.1	3.1	2.5	5.4	6.2	6.4	8.2
12	.....	5.4	5.0	15.5	11.3	4.2	3.0	2.5	4.8	6.0	6.3	8.6
13	.....	.....	.....	15.8	11.0	4.4	2.6	2.7	4.8	6.2	6.6	9.9
14	.....	.....	.....	17.5	10.3	4.6	2.7	2.7	4.8	5.5	7.3	13.6
15	6.9	.....	.....	18.5	9.6	4.9	2.3	2.8	4.4	5.1	7.4	15.6
16	.....	.....	.....	19.6	9.0	5.0	2.6	2.7	4.5	5.0	7.5	13.7
17	.....	.....	.....	19.0	8.6	5.9	2.8	2.8	5.0	4.9	6.9	11.0
18	.....	.....	.....	17.1	8.2	6.1	3.8	3.0	4.9	4.9	6.5	9.7
19	.....	4.7	5.3	15.7	7.7	5.7	3.8	3.5	4.5	6.6	7.0	8.8
20	.....	.....	.....	15.0	7.4	5.4	3.5	3.9	4.5	7.9	7.5	7.8
21	.....	.....	.....	14.6	6.6	5.1	3.0	4.3	4.5	8.5	8.0	7.1
22	6.8	.....	.....	14.3	6.5	4.8	3.0	4.6	4.3	8.2	7.6	8.3
23	.....	.....	.....	13.7	6.4	4.7	3.0	4.8	4.1	8.5	6.8	9.7
24	.....	.....	.....	12.8	6.2	4.5	3.0	4.6	4.0	8.4	6.6	13.9
25	.....	.....	.....	12.7	6.0	4.3	2.6	4.3	4.4	8.7	6.6	14.8
26	.....	5.4	5.6	14.7	6.1	4.0	3.0	4.0	4.5	8.3	6.6	13.1
27	.....	.....	.....	16.6	6.4	3.9	3.8	3.1	4.5	7.5	6.6	9.9
28	.....	.....	.....	18.2	6.3	3.7	3.2	3.3	6.3	7.0	6.9	9.7
29	5.7	.....	11.4	19.6	6.2	3.8	3.5	4.9	6.0	6.7	9.0	8.5
30	.....	.....	11.6	21.0	5.7	3.7	4.5	7.3	5.8	6.4	9.1	8.1
31	.....	.....	11.3	.....	5.5	.....	5.1	7.2	.....	6.4	.....	8.6

NOTE.—Relation of gage height to discharge affected by ice from Jan. 1 to about Mar. 28 and Dec. 31; gage readings to water surface; the thickness of ice varied from about 1.1 to 1.7 feet.

Daily discharge, in second-feet, of Connecticut River at Orford, N. H., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,400	1,600	1,400	9,320	30,800	2,710	1,450	2,020	3,900	3,280	3,800	9,180
2	2,400	1,600	1,300	8,020	32,600	2,800	1,320	2,100	2,710	3,380	3,690	8,450
3	3,000	1,600	1,300	7,600	34,500	3,000	1,140	1,580	2,020	3,480	4,000	6,780
4	4,500	1,600	1,300	6,650	32,100	3,690	1,080	1,520	2,020	3,280	3,800	5,380
5	4,000	1,600	1,300	6,520	31,500	3,180	1,260	1,320	1,860	3,800	3,380	5,500
6	3,800	1,600	1,300	6,780	21,500	2,710	1,200	1,320	2,020	4,560	3,180	5,880
7	3,700	1,600	1,300	10,400	15,700	2,620	1,030	1,260	2,020	6,000	3,280	6,000
8	3,600	1,500	1,300	21,900	11,600	4,340	975	1,140	2,530	5,880	3,900	5,380
9	3,300	1,500	1,200	19,700	12,500	2,800	975	1,030	2,800	5,020	4,120	5,630
10	3,100	1,400	1,200	19,700	12,100	1,790	1,030	1,030	3,090	4,120	3,900	5,760
11	2,900	1,400	1,200	18,000	10,500	1,720	1,080	770	2,800	3,580	3,800	5,880
12	2,800	1,400	1,200	17,600	10,200	1,790	1,030	770	2,260	3,380	3,690	6,390
13	2,700	1,300	1,200	18,200	9,770	1,940	820	870	2,260	3,580	4,000	8,160
14	2,600	1,300	1,200	21,500	8,740	2,100	870	870	2,260	2,900	4,780	14,000
15	2,500	1,200	1,200	23,600	7,740	2,350	680	920	1,940	2,530	4,900	17,800
16	2,400	1,200	1,300	25,900	6,920	2,440	820	870	2,020	2,440	5,020	14,200
17	2,300	1,100	1,300	24,600	6,390	3,280	920	920	2,440	2,350	4,340	9,770
18	2,200	1,100	1,300	20,700	5,880	3,480	1,520	1,030	2,350	2,350	3,900	7,880
19	2,100	1,000	1,300	18,600	5,260	3,090	1,520	1,320	2,020	4,000	4,440	6,650
20	2,100	1,100	1,300	16,600	4,900	2,800	1,320	1,580	2,020	5,500	5,020	5,380
21	2,000	1,100	1,300	15,900	4,000	2,530	1,030	1,860	2,020	6,260	5,630	4,560
22	2,000	1,200	1,400	15,300	3,900	2,260	1,030	2,100	1,860	5,880	5,140	6,000
23	1,900	1,200	1,400	14,200	3,800	2,180	1,030	2,260	1,720	6,260	4,220	7,880
24	1,900	1,300	1,500	12,600	3,580	2,020	1,030	2,100	1,650	6,130	4,000	14,600
25	1,800	1,300	1,500	12,500	3,380	1,860	820	1,860	1,940	6,520	4,000	16,300
26	1,800	1,400	1,500	16,100	3,480	1,650	1,030	1,650	2,020	6,000	4,000	13,200
27	1,700	1,400	3,500	19,700	3,800	1,580	1,520	1,080	2,020	5,020	4,000	8,160
28	1,700	1,400	7,000	22,900	3,690	1,450	1,140	1,200	3,690	4,440	4,340	7,880
29	1,600	.....	10,400	25,900	3,580	1,520	1,320	2,350	3,380	4,120	6,920	6,260
30	1,600	.....	10,700	28,900	3,090	1,450	2,020	4,780	3,180	3,800	7,050	5,760
31	1,600	.....	10,200	.....	2,900	.....	2,530	4,670	.....	3,800	.....	5,000

NOTE.—Daily discharge for open channel determined from a well-defined discharge rating curve. Discharge Jan. 1 to Mar. 26 is only approximate, and is obtained from approximate ice discharge rating curves developed in earlier years and from climatologic records. Discharge Mar. 27 and 28 and Dec. 31 estimated.

Monthly discharge of Connecticut River at Orford, N. H., for 1911.

[Drainage area, 3,300 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area.)	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	4,500	1,600	2,520	0.764	0.88	C.
February	1,600	1,000	1,360	.412	.43	C.
March	10,700	1,200	2,450	.742	.86	C.
April	28,900	6,520	16,800	5.09	5.68	A.
May	34,500	2,900	11,300	3.42	3.94	A.
June	4,340	1,450	2,440	.739	.82	A.
July	2,530	680	1,180	.358	.41	A.
August	4,780	770	1,620	.491	.57	A.
September	3,900	1,650	2,360	.715	.80	A.
October	6,520	2,350	4,310	1.31	1.51	A.
November	7,050	3,180	4,340	1.32	1.47	A.
December	17,800	4,560	8,250	2.50	2.88	A.
The year	34,500	680	4,930	1.49	20.25	

CONNECTICUT RIVER AT SUNDERLAND, MASS.

Location.—At the five-span steel highway bridge at Sunderland, Mass., on the road leading to South Deerfield, about 18 miles in a direct line and about 26 miles by river above the dam at Holyoke. Deerfield River enters the Connecticut from the west about 8 to 10 miles above the station.

Records available.—March 31, 1904, to December 31, 1911. From 1880 to 1899 a record of the discharge of this stream was maintained at Holyoke, Mass.

Drainage area.—7,700 square miles.

Gage.—Chain gage attached to highway bridge; read twice daily.

Channel.—Deep; coarse gravel; subject to change.

Discharge measurements.—Made from highway bridge.

Artificial control.—The first dam is about 12 miles above the station at Turners Falls, Mass.; the next about 29 miles above, near Hinsdale, N. H. There are others farther upstream and also on Deerfield, Millers, and other tributaries that operate to affect, more or less, the normal flow of the stream.

Winter flow.—During portions of December and up to early March relation of gage height to discharge is considerably affected by ice.

Accuracy.—Discharge rating curve fairly well defined; open-water estimates considered good.

Cooperation.—Station maintained in cooperation with several New England power companies, which pay for the gage readings.

Discharge measurements of Connecticut River at Sunderland, Mass., for 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Apr. 13	W. G. Hoyt	12.06	33,000
29	C. S. De Golyer	15.80	48,700

Daily gage height, in feet, of Connecticut River at Sunderland, Mass., for 1911.

[V. Lower, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.8	7.6	6.4	9.5	15.8	4.1	3.4	3.5	5.1	3.6	6.2	8.5
2	6.1	.....	.....	7.6	16.9	4.2	2.4	3.5	4.7	4.8	6.4	8.6
3	7.5	.....	.....	6.6	17.5	4.2	1.7	3.4	4.6	5.6	6.2	8.6
4	15.8	6.9	6.6	6.6	16.6	3.7	1.4	3.4	3.2	5.4	5.8	6.8
5	15.5	.....	.....	6.1	15.2	4.1	1.8	3.1	2.6	6.8	5.3	6.6
6	13.8	.....	4.4	6.6	13.8	4.3	2.0	2.0	3.6	6.8	5.5	5.4
7	13.1	.....	.....	12.5	11.7	4.4	2.2	2.0	3.8	7.2	5.6	5.0
8	11.6	6.6	.....	16.4	9.5	5.0	2.1	2.5	3.4	6.9	6.8	5.4
9	12.1	.....	4.3	16.4	9.1	4.5	1.4	2.7	4.1	6.4	6.6	5.6
10	11.6	.....	.....	14.3	8.9	5.4	1.2	2.5	6.3	6.4	6.6	5.8
11	11.2	6.2	5.2	12.5	8.8	4.2	2.0	2.2	5.0	5.5	6.3	5.8
12	10.7	.....	.....	12.0	8.5	3.0	2.6	2.0	4.4	5.6	6.0	6.3
13	10.6	4.4	3.4	12.1	8.3	5.6	2.4	1.15	4.2	5.0	6.4	7.0
14	10.4	.....	.....	13.4	8.4	5.5	2.4	.98	3.9	4.6	6.6	7.8
15	9.7	.....	5.9	16.2	6.8	5.1	2.3	1.8	4.0	4.7	6.6	9.8
16	9.4	.....	6.1	18.8	6.7	4.8	1.2	1.8	3.8	3.9	6.7	10.8
17	.....	.....	6.1	17.4	6.4	4.3	1.15	2.0	3.1	4.1	6.6	10.5
18	.....	4.8	5.9	15.9	6.1	4.5	2.0	1.9	4.4	4.6	6.6	10.0
19	8.0	.....	5.2	14.2	6.6	4.6	2.1	1.8	4.1	14.4	8.6	8.8
20	.....	4.2	4.7	13.7	5.7	4.3	2.2	1.0	4.0	16.0	7.4	7.9
21	.....	.....	5.8	13.4	5.4	4.0	2.0	1.0	4.0	12.6	7.6	6.6
22	6.6	.....	6.0	13.3	5.4	4.1	2.0	1.7	3.9	12.6	7.9	5.5
23	.....	5.7	6.1	12.7	4.9	4.1	1.3	1.7	3.4	11.4	7.1	7.6
24	.....	.....	5.7	11.6	4.8	3.8	1.1	2.0	2.5	11.0	6.4	12.4
25	.....	6.1	5.3	12.3	4.4	2.8	1.9	2.0	2.45	9.8	6.5	12.4
26	7.2	5.1	6.0	12.8	4.3	2.2	2.2	2.8	2.8	8.8	6.6	12.1
27	.....	.....	4.5	13.6	4.6	3.5	2.4	2.2	3.7	8.2	6.3	11.4
28	8.2	.....	13.0	13.8	3.6	3.5	2.6	2.4	3.7	8.8	5.8	10.0
29	8.2	.....	11.6	15.8	2.65	3.4	2.3	3.1	3.5	8.6	6.6	8.6
30	.....	.....	11.7	16.4	3.4	3.6	1.8	4.0	3.9	4.6	8.7	7.4
31	.....	.....	10.8	.....	4.3	.....	2.6	5.0	.....	5.8	.....	7.0

NOTE.—Relation of gage height to discharge affected by ice from Jan. 1 to about Mar. 21. The observer notes that the ice broke up Jan. 4 and that the ice went out Mar. 22. The ice was also broken up near the shore two or three times during the winter. Although there may have been free flow on Jan. 4, it is believed that the relation of gage height to discharge was affected by backwater from ice jams during the remainder of the month. Gage readings were probably to water surface, except Jan. 16 to Mar. 13, which were to the top of the ice.

Daily discharge, in second-feet, of Connecticut River at Sunderland, Mass., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	22,500	48,500	5,830	4,400	4,590	8,150	4,790	11,200	18,900
2	.....	15,800	53,400	6,050	2,720	4,590	7,180	7,480	11,900	19,200
3	.....	12,500	56,200	6,050	1,850	4,400	6,950	9,470	11,200	19,200
4	.....	12,500	52,100	4,990	1,530	4,400	4,030	8,920	10,000	13,100
5	.....	11,000	45,900	5,830	1,960	3,850	3,020	13,100	8,660	12,500
6	.....	12,500	39,800	6,270	2,200	2,200	4,790	13,100	9,190	8,920
7	.....	34,300	31,100	6,490	2,450	2,200	5,200	14,400	9,470	7,900
8	.....	51,600	22,500	7,900	2,320	2,870	4,400	13,500	13,100	8,920
9	.....	51,600	21,000	6,720	1,530	3,170	5,830	11,900	12,500	9,470
10	.....	41,900	20,300	8,920	1,330	2,870	11,600	11,900	12,500	10,000
11	.....	34,300	19,900	6,050	2,200	2,450	7,900	9,190	11,600	10,000
12	.....	32,300	18,900	3,670	3,020	2,200	6,490	9,470	10,600	11,600
13	.....	32,700	18,200	9,470	2,720	1,280	6,050	7,900	11,900	13,800
14	.....	38,100	18,500	9,190	2,720	1,110	5,410	6,950	12,500	16,400
15	.....	50,300	13,100	8,150	2,580	1,960	5,620	7,180	12,500	23,700
16	.....	62,100	12,800	7,420	1,330	1,960	5,200	5,410	12,800	27,600
17	.....	55,700	11,900	6,270	1,280	2,200	3,850	5,830	12,500	26,400
18	.....	49,000	11,000	6,720	2,200	2,080	6,490	6,950	12,500	24,400
19	.....	41,500	12,500	6,950	2,320	1,960	5,830	42,400	19,200	19,900
20	.....	39,400	9,760	6,270	2,450	1,130	5,620	49,400	15,100	16,800

Daily discharge, in second-feet, of Connecticut River at Sunderland, Mass., for 1911—Con.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
21	.....	38,100	8,920	5,620	2,200	1,130	5,620	34,700	15,800	12,500
22	10,600	37,600	8,920	5,830	2,200	1,850	5,410	34,700	16,800	9,190
23	11,000	35,100	7,660	5,830	1,430	1,850	4,400	29,900	14,100	15,800
24	9,760	30,700	7,420	5,200	1,230	2,200	2,870	28,300	11,900	33,900
25	8,660	33,500	6,490	3,330	2,080	2,200	2,800	23,700	12,200	33,900
26	10,600	35,600	6,270	2,450	2,450	3,330	3,330	19,900	12,500	32,700
27	6,720	38,900	6,950	4,590	2,720	2,450	4,990	17,800	11,600	29,900
28	36,400	39,800	4,790	4,590	3,020	2,720	4,990	19,900	10,000	24,400
29	30,700	48,500	3,100	4,400	2,580	3,850	4,590	19,200	12,500	19,200
30	31,100	51,200	4,400	4,790	1,960	5,620	5,410	6,950	19,600	15,100
31	27,600	.....	6,270	.....	3,020	7,900	.....	10,000	.....	13,800

NOTE.—Daily discharge determined from a well-defined discharge rating curve.

Monthly discharge of Connecticut River at Sunderland, Mass., for 1911.

[Drainage area, 7,700 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	.....	.....	10,000	1.30	1.50	C.
February	.....	.....	4,200	.545	.57	C.
March	36,400	.....	8,960	1.16	1.34	B.
April	62,100	11,000	36,400	4.73	5.28	A.
May	56,200	3,100	19,600	2.55	2.94	A.
June	9,470	2,450	6,060	.787	.88	A.
July	4,400	1,230	2,260	.294	.34	A.
August	7,900	1,110	2,860	.371	.43	A.
September	11,600	2,800	5,470	.710	.79	A.
October	49,400	4,790	16,300	2.12	2.44	A
November	19,600	8,660	12,600	1.64	1.83	A.
December	33,900	7,900	18,000	2.34	2.70	A.
The year	62,100	1,110	11,900	1.55	21.04	

NOTE.—Discharge Jan. 1 to Mar. 21 estimated from the discharge of the Connecticut at Orford, White River at Sharon, Deerfield River at Shelburne Falls, and climatologic records. Mean discharge Mar. 1 to 21 estimated 4,500 second-feet.

PASSUMPSIC RIVER NEAR ST. JOHNSBURY, VT.

Location.—At steel suspension bridge just below dam of Pierce's mills, about 5 miles above St. Johnsbury, 2 miles below the mouth of Sheldon Branch, 4 miles above the mouth of Moose River, and 5 miles above the mouth of Sleepers River.

Records available.—May 26, 1909, to December 31, 1911. A station was established June 29, 1903, on Passumpsic River at St. Johnsbury Center, but was discontinued November 30 of the same year because of backwater from the dam at St. Johnsbury.

Drainage area.—237 square miles.

Gage.—Staff, in two sections; low-water section a vertical staff bolted to ledge just above bridge; high-water section an inclined staff bolted to ledge just below bridge.

Channel.—Semipermanent; bed composed chiefly of gravel, but near right bank consists of a rock ledge.

Discharge measurements.—At high stages made from downstream side of bridge; at low stages, by wading 200 feet below.

Winter flow.—River freezes over under the bridge and at control point 300 feet below; relation of gage height to discharge is therefore affected by ice.

Artificial control.—Discharge affected by the operation of Pierce's mills, just above station, and by other mills farther upstream. The storage at Pierce's mills is small and the use of water nearly uniform during the day and night, so that the daily gage readings are fairly accurate indices of the daily discharge.

Accuracy.—The discharge rating curve is fairly well defined.

Cooperation.—Station maintained in cooperation with the State of Vermont.

Discharge measurements of Passumpsic River near St. Johnsbury, Vt., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
June 23[a]	G. H. Canfield	1.60	164
Aug. 1[b]	do	1.42	119

[a] Measurements made by wading. [b] Wading below bridge 100 feet.

Daily gage height, in feet, of Passumpsic River near St. Johnsbury, Vt., for 1911.

[Joseph Cox, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.7	2.5	.....	3.4	6.8	2.10	1.40	1.48	1.50	1.96	2.10	2.45
2	2.6	2.45	.....	2.95	7.3	2.15	1.40	1.45	1.45	1.90	1.98	2.20
3	3.4	2.55	.....	2.0	5.2	1.85	1.39	1.42	1.59	1.74	1.84	2.10
4	3.2	2.55	.....	2.8	4.0	1.74	1.32	1.38	1.55	2.10	1.80	1.93
5	2.9	2.6	2.3	2.85	3.6	1.65	1.36	1.36	1.45	2.90	1.78	1.98
6	2.7	.....	.....	3.1	3.5	1.62	1.35	1.25	2.05	2.45	1.72	2.00
7	2.55	.....	.....	5.2	3.4	1.59	1.35	1.22	2.20	2.10	2.05	1.98
8	2.5	.....	.....	5.8	3.4	1.56	1.40	1.32	1.69	1.89	2.30	1.98
9	2.55	.....	.....	4.8	3.3	1.54	1.22	1.32	1.61	1.82	2.05	1.98
10	2.45	.....	.....	4.1	3.1	1.50	1.38	1.31	1.76	1.74	1.91	2.20
11	2.4	.....	.....	3.7	2.9	1.56	1.36	1.20	1.62	1.69	1.98	2.40
12	2.4	2.55	2.6	4.4	2.8	1.91	1.26	1.30	1.58	1.68	1.94	3.30
13	2.4	.....	.....	5.0	2.6	1.98	1.20	1.22	1.66	1.64	2.90	5.80
14	2.45	.....	.....	6.0	2.5	1.81	1.24	1.31	1.48	1.59	2.25	3.90
15	2.45	.....	.....	7.2	2.4	1.90	1.30	1.25	1.51	1.55	2.15	3.10
16	2.3	.....	.....	6.4	2.5	2.25	1.61	1.54	2.20	1.57	2.10	2.80
17	2.2	.....	.....	4.6	2.35	2.30	1.28	1.52	1.74	1.51	1.84	2.65
18	2.4	.....	.....	3.9	2.25	1.91	1.50	1.44	1.64	1.64	2.25	2.60
19	2.4	2.85	2.4	4.0	2.3	1.70	1.50	2.75	1.51	3.30	2.65	2.25
20	2.25	.....	.....	4.7	2.2	1.68	1.40	1.85	1.49	2.45	2.25	2.90
21	2.3	.....	.....	4.6	2.1	1.88	1.50	1.61	1.46	2.05	2.10	2.35
22	2.4	.....	.....	4.6	2.0	1.68	1.46	1.48	1.80	2.00	2.10	2.25
23	2.3	.....	.....	4.0	1.89	1.61	1.40	1.40	1.75	2.60	1.92	6.20
24	2.3	.....	.....	4.4	1.91	1.55	1.32	1.39	1.55	2.70	2.10	4.50
25	2.3	.....	.....	5.9	2.05	1.51	2.10	1.28	1.68	2.20	1.98	3.50
26	2.35	2.65	2.4	6.3	2.30	1.45	1.55	1.34	2.45	2.05	1.90	2.85
27	2.35	.....	2.7	6.7	2.05	1.38	1.40	1.31	1.88	1.98	2.00	2.80
28	2.6	.....	3.7	7.1	1.90	1.46	1.39	1.41	1.88	1.98	1.98	2.70
29	2.6	.....	4.6	7.3	1.85	1.49	2.20	2.95	1.79	1.89	3.60	2.10
30	2.7	.....	4.5	7.0	1.70	1.46	2.15	1.80	2.20	1.88	2.80	2.70
31	2.5	.....	3.9	.....	1.62	.....	1.66	1.62	.....	1.86	.....	2.60

NOTE.—Relation of gage height to discharge affected by ice from Jan. 1 to about Apr. 6. The observer noted that the river was clear of ice at noon Apr. 15. There was some ice Dec. 20 to 22 and 29 to 31, but there was probably no material backwater effect. Gage heights were probably to water surface, except Feb. 12 to Mar. 26, which were to the top of the ice.

Daily discharge, in second-feet, of Passumpsic River near St. Johnsbury, Vt., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	500	2,280	307	116	134	139	264	307	420
2	.....	400	2,500	322	116	128	128	246	270	338
3	.....	200	1,560	232	114	121	161	200	229	307
4	.....	300	1,040	200	99	112	151	307	217	255
5	.....	300	864	176	108	108	128	580	211	270
6	.....	550	822	168	106	85	292	420	195	276
7	.....	1,560	780	161	106	99	338	307	292	270
8	.....	1,820	780	153	116	99	186	243	370	270
9	.....	1,380	738	149	79	99	166	223	292	270
10	.....	1,080	657	139	112	97	206	200	249	338
11	.....	906	580	153	108	75	168	186	270	403
12	.....	1,210	543	249	87	95	158	184	258	738
13	.....	1,470	472	270	75	79	179	173	580	1,820
14	.....	1,920	437	220	83	97	134	161	354	992
15	.....	2,460	403	246	95	85	141	151	322	657
16	.....	2,100	437	354	166	149	338	156	307	543
17	.....	1,290	386	370	91	144	200	141	229	490
18	.....	992	354	249	139	125	173	173	354	472
19	.....	1,040	370	189	139	525	141	738	490	354
20	.....	1,340	338	184	116	232	137	420	354	276
21	.....	1,290	307	240	139	166	130	292	307	386
22	.....	1,290	276	184	130	134	217	276	307	354
23	.....	1,040	243	166	116	116	203	472	252	2,000
24	.....	1,210	249	151	99	114	151	507	307	1,250
25	.....	1,870	292	141	307	91	184	338	270	822
26	.....	2,050	370	128	151	103	420	292	246	562
27	150	2,230	292	112	116	97	240	270	276	543
28	600	2,410	246	130	114	118	240	270	270	507
29	900	2,500	232	137	338	599	214	243	864	307
30	900	2,360	189	130	322	217	338	240	543	507
31	600	.....	168	.....	179	168	.....	234	.....	472

NOTE.—Daily discharge determined from a well-defined discharge rating curve. Discharge estimated Mar. 27 to Apr. 6. No correction made during December.

Monthly discharge of Passumpsic River near St. Johnsbury, Vt., for 1911.

[Drainage area, 237 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	.....	.....	190	0.802	0.92	C.
February	.....	.....	100	.422	.44	C.
March	900	.....	185	.781	.90	C.
April	2,500	200	1,370	5.78	6.45	A.
May	2,500	168	620	2.62	3.02	A.
June	370	112	200	.844	.94	A.
July	338	75	135	.570	.66	A.
August	599	75	149	.629	.73	A.
September	420	128	200	.844	.94	A.
October	580	141	287	1.21	1.40	A.
November	864	195	326	1.38	1.54	A.
December	2,000	255	564	2.38	2.74	A.
The year	2,500	75	361	1.52	20.68	

NOTE.—Discharge Jan. 1 to Apr. 6 estimated from the discharge for Connecticut River at Orford, White River near Sharon, and climatologic records. Mean discharge Mar. 1 to 26 estimated 100 second-feet.

WHITE RIVER NEAR SHARON, VT.

Location.—About 1,500 feet below the dam of the Vermont Copper Co., near Sharon, Vt., and about 800 feet above the Central Vermont Railway bridge.

Records available.—May 13, 1909, to December 31, 1911.

Drainage area.—686 square miles.

Gage.—An inclined staff reading to 10 feet, attached to a large rock on the left bank. A chain gage for use at high stages is nailed to trees about 80 feet upstream from the staff gage.

Channel.—Divided by an island above the gages.

Discharge measurements.—Made from two suspension foot bridges which connect the island with the banks.

Artificial control.—There are several power plants above the station, but it is assumed that fluctuations in daily stage caused by operation of these plants are sufficiently equalized at the dam of the Vermont Copper Co. A gage record of the height of water on the crest of this dam has been obtained, beginning January 29, 1910. The dam is not much used at present.

Winter flow.—Affected by ice.

Accuracy.—Conditions favor obtaining reliable data. By means of an approximate curve of relation between the daily gage readings at the dam and daily discharge at the current-meter station, fair records of discharge have been computed for the winter months from the gage heights at the dam.

Cooperation.—Station established in cooperation with the State of Vermont.

The following discharge measurement was made by G. H. Canfield:
June 18, 1911: Gage height, 3.80 feet; discharge, 306 second-feet.

Daily gage height, in feet, of White River near Sharon, Vt., for 1911.

[Chas. Tucker, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.1	4.3	4.4	4.8	6.9	4.0	3.7	3.7	4.0	4.4	4.8	5.0
2	5.4	4.3	4.4	4.5	7.5	4.1	3.7	3.6	4.0	4.3	4.8	4.9
3	7.5	4.2	4.4	4.3	6.4	4.0	3.7	3.5	4.1	4.4	4.7	4.7
4	5.9	4.2	4.3	4.3	5.6	4.0	3.6	3.5	4.0	4.3	4.6	4.4
5	5.5	4.2	4.2	4.3	5.4	4.0	3.6	3.5	4.0	5.2	4.5	4.2
6	5.1	4.2	4.3	4.9	5.2	4.0	3.6	3.5	4.2	4.8	4.5	4.4
7	4.8	4.2	4.5	9.5	5.1	4.0	3.9	3.4	4.1	4.7	5.0	4.4
8	4.7	4.2	4.2	7.0	5.0	3.9	3.8	3.4	4.1	4.6	4.8	4.4
9	4.7	4.2	4.1	6.3	4.9	3.9	3.8	3.4	4.3	4.6	4.7	4.5
10	4.5	4.3	4.2	5.9	4.8	3.9	3.7	3.4	4.6	4.5	4.6	4.5
11	4.4	4.3	4.2	5.8	4.7	3.9	3.6	3.5	4.2	4.4	4.6	4.7
12	4.4	5.0	4.0	6.0	4.6	4.0	3.5	3.5	4.2	4.4	4.6	5.5
13	4.5	4.9	4.0	6.5	4.5	4.0	3.5	3.5	4.1	4.3	5.0	5.7
14	4.6	4.4	4.1	7.0	4.4	3.9	3.5	3.4	4.0	4.3	4.4	5.5
15	4.5	4.4	4.0	8.5	4.3	3.9	3.4	3.5	4.2	4.2	4.7	5.1
16	4.4	4.4	4.1	8.0	4.3	3.9	3.4	3.4	4.7	4.1	4.5	4.9
17	4.4	4.3	4.0	6.6	4.3	3.8	3.4	3.4	4.5	4.1	4.5	5.0
18	4.3	4.6	3.9	6.4	4.2	3.8	3.9	3.4	4.4	4.2	4.6	4.9
19	4.3	4.4	3.9	6.5	4.2	3.8	3.8	3.6	4.3	8.5	5.1	4.6
20	4.3	4.3	3.9	6.5	4.1	3.8	3.7	4.0	4.4	7.4	4.8	4.4
21	4.3	4.3	3.9	6.4	4.0	3.8	3.7	3.8	4.3	6.0	4.7	4.4
22	4.3	4.3	3.9	6.4	4.0	3.7	3.6	3.7	3.9	5.7	4.6	4.6
23	4.2	4.3	3.9	6.2	4.0	3.6	3.6	3.5	4.1	5.5	4.6	7.6
24	4.2	4.2	4.0	6.0	4.0	3.6	3.6	3.5	3.4	5.5	4.6	6.15
25	4.1	4.2	4.0	6.6	4.2	3.7	3.7	3.6	3.9	5.2	4.5	5.5
26	4.1	4.2	4.1	7.0	4.1	4.2	3.6	3.5	4.0	5.0	4.5	5.3
27	4.2	4.4	4.5	7.2	4.1	4.0	3.6	3.6	4.0	4.9	4.5	5.1
28	4.5	4.4	6.7	8.5	4.0	3.9	3.5	3.7	3.9	4.8	4.4	5.1
29	4.9	.....	6.5	7.0	4.2	4.0	4.0	6.2	4.1	4.7	5.5	4.7
30	4.7	.....	5.5	6.2	4.1	3.8	3.9	4.8	4.1	4.7	5.2	4.5
31	4.5	.....	5.3	.....	4.0	.....	3.8	4.3	.....	5.0	.....	4.4

NOTE.—Relation of gage height to discharge was affected by ice Jan. 1 and 2, and Jan. 5 to Mar. 26. There was also a little ice Jan. 20 to 22, but probably no appreciable backwater. Gage readings were probably to water surface during the periods when ice was present.

Daily discharge, in second-feet, of White River near Sharon, Vt., for 1911.

Day.	Jan.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	398	450	1,180	4,520	440	255	255	440	770	1,180	1,430
2	620	450	865	5,770	515	255	210	440	680	1,180	1,300
3	5,770	398	680	3,560	440	255	175	515	770	1,070	1,070
4	2,720	450	680	2,260	440	210	175	440	680	965	770
5	940	345	680	1,970	440	210	175	440	1,700	865	595
6	810	450	1,300	1,690	440	210	175	595	1,180	865	770
7	875	450	10,200	1,560	440	370	140	515	1,070	1,430	770
8	745	450	4,730	1,430	370	310	140	515	965	1,180	770
9	940	505	3,380	1,300	370	310	140	680	965	1,070	865
10	810	450	2,720	1,180	370	255	140	965	865	965	865
11	745	345	2,560	1,070	370	210	175	595	770	965	1,070
12	875	345	2,870	965	440	175	175	595	770	965	2,120
13	810	345	3,740	865	440	175	175	515	680	1,430	2,410
14	940	345	4,730	770	370	175	140	440	680	770	2,120
15	810	450	7,960	680	370	140	175	595	595	1,070	1,560
16	505	450	6,850	680	370	140	140	1,070	515	865	1,300
17	505	450	3,940	680	310	140	140	865	515	865	1,430
18	560	398	3,560	595	310	370	140	770	595	965	1,300
19	560	345	3,740	595	310	310	210	685	7,960	1,560	965
20	505	345	3,740	515	310	255	440	770	5,560	1,180	770
21	560	345	3,560	440	310	255	310	685	2,870	1,070	770
22	560	345	3,560	440	255	210	255	370	2,410	965	965
23	450	345	3,200	440	210	210	175	515	2,120	965	5,980
24	398	345	2,870	440	210	210	175	140	2,120	965	3,120
25	398	398	3,940	595	255	255	210	370	1,700	865	2,120
26	345	450	4,730	515	595	210	175	440	1,430	865	1,830
27	398	865	5,140	515	440	210	210	440	1,300	865	1,560
28	810	4,130	7,960	440	370	175	255	370	1,180	770	1,560
29	1,010	3,740	4,730	595	440	440	3,200	515	1,070	2,120	1,070
30	745	2,120	3,200	515	310	370	1,180	515	1,070	1,690	865
31	560	1,830	.....	440	.....	310	680	.....	1,430	.....	770

NOTE.—Daily discharge Jan. 3 and 4 and Mar. 27 to Dec. 31 determined from a well-defined discharge rating curve applicable to readings on the staff gage below the dam. Discharge Jan. 1 and 2, 5 to 31, and Mar. 1 to 26 determined from a fairly well-defined discharge rating curve applicable to readings referred to the gage on the dam.

Discharge during January, February, and March, determined from the gage heights on the crest of the dam, is subject to some slight error as the stream was obstructed by ice. During February this obstruction was probably over 25 per cent and estimates of daily discharges for this month are accordingly omitted.

The figures presented in this table do not agree well with those derived from the gage heights read on the crest of the dam at extreme high stages, the latter being but 50 to 75 per cent of the former. No explanation can be given this discrepancy.

Monthly discharge of White River near Sharon, Vt., for 1911.

[Drainage area, 686 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area.)	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	5,770	345	893	1.30	1.50	B.
February	.....	.....	350	.510	.53	C.
March	4,130	345	746	1.09	1.26	B.
April	10,200	680	3,770	5.50	6.14	B.
May	5,770	440	1,230	1.79	2.06	A.
June	595	210	375	.547	.61	B.
July	440	140	245	.357	.41	B.
August	3,200	140	337	.491	.57	A.
September	1,070	140	560	.816	.91	A.
October	7,960	515	1,520	2.22	2.56	A.
November	2,120	770	1,080	1.57	1.75	A.
December	5,980	595	1,450	2.11	2.43	A.
The year	10,200	140	1,050	1.53	20.73	

NOTE.—Discharge for February estimated on the basis of the discharge of Deerfield River at Shelburne Falls, Mass., and Passumpsic River at St. Johnsbury, Vt. The monthly discharge for the gaging station is considered preferable to that determined from crest gage heights on the dam. There is considerable discrepancy between the two sets of records for some months, partly explained by storage effect and partly by lack of information regarding the use of sluiceways under the dam.

ASHUELOT RIVER AT HINSDALE, N. H.

Location.—At the lower highway bridge in the town of Hinsdale about a quarter of a mile below the dam used by the Fisk Paper Co. and the Haile & Frost Manufacturing Co. and about 2 miles above the mouth of the river.

Records available.—February 22, 1907, to December 31, 1909.

Drainage area.—440 square miles.

Gage.—Chain attached to the bridge; read twice daily; datum unchanged.

Channel.—Somewhat rough and rocky; probably permanent.

Discharge measurements.—Made from the bridge.

Artificial control.—The use of water at the dam at Hinsdale causes great fluctuations in daily stage during the low-water season.

Winter flow.—Affected by ice.

Accuracy.—Conditions favor accurate discharge measurements and a good discharge rating curve has been developed. The relation between the gage height and discharge is not affected by backwater from the Connecticut except possibly at very high stages in that stream. Accurate computation of the diurnal fluctuation of discharge caused by the operation of the mills above the station has been rendered impossible by insufficient funds. It is proposed to install an automatic gage to determine the relation between the daily gage heights heretofore recorded and the true mean gage heights, thus making possible the publication of accurate computations of daily discharge from the inception of the station to date. The gage heights for 1911 are withheld pending this investigation, as no gage heights recorded at this station are true indices of the daily discharge.

Cooperation.—Records furnished by Frederick S. Leonard, of the Fisk Paper Co.

Discharge measurements of Ashuelot River at Hinsdale, N. H., 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 22[a]	F. J. Shuttleworth	3.34	250
Apr. 25	C. C. Covert	4.40	1,070

[a] Very little ice along the shore.

MILLERS RIVER AT WENDELL, MASS.

Location.—At the railroad bridge just west of the Wendell railroad station.

Records available.—June 4, 1909, to December 31, 1909.

Drainage area.—354 square miles.

Gage.—Chain attached to the railroad bridge; datum unchanged. The gage heights are observed under the direction of F. B. Saunders, superintendent of the Orange Electric Light Co.

Channel.—Bed rough; current swift.

Discharge measurements.—Made from the railroad bridge or by wading.

Artificial control.—Immediately above the station and 600 feet below an old dam which it replaces is a dam completed June 1, 1910, by the Orange Electric Light Co. Power was first delivered at this new plant June 8, 1910. The wheels at the old dam were run at irregular intervals prior to the completion of the new dam to furnish power and to divert water from the construction work. During low-water period the use of these wheels interfered seriously with the determination of the true daily flow of the river, but an attempt was made by means of a series of frequent readings through the day and night to ascertain the two most favorable times of day for reading the gage heights in order to show the true mean

height of the river for that day. During 1910 a new dam was also completed 1½ miles below the gage. This dam causes backwater at the gage at medium and high stages, requiring a new discharge rating curve. To what extent this backwater effect is variable is not known.

Winter flow.—Ice forms in the still water below the bridge and causes backwater at the gaging section.

Accuracy.—Two good discharge rating curves have been developed from the 1910–11 discharge measurements. Accurate computation of the diurnal fluctuation of discharge caused by the operation of the mills above the station has been rendered impossible by insufficient funds. It is proposed to install an automatic gage to determine the diurnal fluctuation in the daily gage heights provided the changed conditions since the construction of the two new dams will warrant it, thus making possible the publication of accurate computations of daily discharge from the inception of the station to date. The gage heights for 1911 are witheld pending this investigation, as no gage heights recorded at this station are true indices of the daily discharge. How far it will be possible to reclaim the records of gage heights taken prior to the construction of the two new dams is impossible to say, but every reasonable effort will be made to determine the discharge as accurately as possible for this station for 1909 to 1911 by means of a thorough study of the conditions during those years.

Cooperation.—Station maintained in cooperation with the State of Massachusetts and the Orange Electric Light Co.

Discharge measurements of Millers River near Wendell, Mass., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Jan. 12[a]	F. J. Shuttleworth	1.45	204
24[b]	F. B. Saunders	1.34	186
29[c]	....do	1.69	270
Feb. 11[d]	....do	1.25	124
20	....do	1.42	208
27	....do	1.82	332
28	....do	2.15	499
Mar. 11	....do	3.10	936
15	....do	2.90	879
17	....do	3.00	799
28	....do	5.30	2,750
29	....do	4.80	2,480
30	....do	5.10	2,630
31	....do	4.92	2,530
Apr. 2[e]	....do	2.95	1,090
4[f]	....do	2.48	1,030
4[g]	....do	2.49	805
6	....do	3.25	1,130
7[h]	....do	4.38	2,200
8[i]	....do	4.55	2,230
8[j]	....do	4.23	2,150

[a] River clear of ice at gaging section. Complete ice cover at railroad bridge 400 feet below.
[b] Head at Stoneville, 72.6; small wheels, 0.64 gate.
[c] Head at Stoneville, 77.25; at Wendell, 98.5; gage No. 1 read .90.
[d] Head at Stoneville, 76.62.
[e] Head at Stoneville, 77.0; at Wendell, 99.1; 3 sluice gates, 3 by 4 feet open; elevation center, 82.0 feet; elevation crest of dam, 98.0; length of dam crest 190 feet.
[f] Head at Stoneville, 75.6; at Wendell, 99.1.
[g] Head at Stoneville, 77.5.
[h] Head at Stoneville, 78.7.
[i] Head at Stoneville, 78.8.
[j] Head at Stoneville, 78.7.

NOTE.—Normal tail water elevation at Wendell, 77.6.

DEERFIELD RIVER AT HOOSAC TUNNEL, MASS.

Location.—At wooden highway bridge near Hoosac Tunnel railroad station, about 4½ miles below the mouth of Dunbar Brook, 4 miles above Pelham Brook, and 4 miles above Cold Brook.

Records available.—August 8, 1909, to December 31, 1909. A measurement was made at the bridge October 29, 1906.

Drainage area.—257 square miles.

Gage.—Chain, fastened to left-hand downstream side of bridge; read at 8 a. m. and 3.30 p. m. Datum unchanged.

Channel.—Permanent. The bed is of coarse gravel and is very rough.

Discharge measurements.—At high stages made from upstream side of highway bridge; at low stages by wading.

Winter flow.—Relation of gage height to discharge is affected by ice, as the river freezes completely over.

Artificial control.—The operation of numerous mills on the main river and its tributaries above the station completely controls the flow of the river except at high stages and causes considerable fluctuations in gage heights during the day. The nearest mill is at Monroe Bridge about 7 miles upstream.

Accuracy.—Special readings have shown that the average of the gage heights at 8 a. m. and 3.30 p. m. represent fairly well on the average the mean gage height for each 24 hours. A fairly good discharge rating curve has been developed.

Cooperation.—Station maintained in cooperation with the State of Massachusetts. The gage heights for 1911 are withheld pending further investigation and improvement of computations of discharge from records obtained from an automatic gage.

Discharge measurements of Deerfield River at Hoosac Tunnel, Mass., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Jan. 12[a]	F. J. Shuttleworth	2.42	397
31[a]	do	2.47	417
Mar. 6[a]	do	1.92	169
21[a]	do	2.03	218
31	C. C. Covert	3.32	1,060
Apr. 25	C. S. De Golyer	4.41	2,200
June 17	G. H. Canfield	2.79	700
July 13[b]	W. G. Hoyt	1.11	44.7
13[b]	do	.99	27.2
13[b]	do	.98	25.4
Aug. 19[b]	Frank Weber	1.86	157
20[b]	do	1.64	130
21[b]	do	1.14	50
Nov. 30[c]	do	3.70	1,390

[a] Measurements made under partial ice cover.
[b] Measurements made by wading one-half mile below gage.
[c] High velocities may cause error in this measurement, as there was not enough lead to hold meter down.

DEERFIELD RIVER AT SHELBURNE FALLS, MASS.

Location.—At the plant of the Greenfield Electric Light & Power Co. at Shelburne Falls.

Records available.—June 1, 1907 to December 31, 1911.

Drainage area.—501 square miles.

Dam and power plant.—The dam is of concrete, of ogee section, and is similar in form to one that has been rated. The height of the dam was raised 3 feet in the fall of 1908. Two units are now installed. Ratings of one of these units have been made by the Survey for use in conjunction with the Holyoke ratings of the wheels. The total electrical output is measured twice a day.

Computations of discharge.—The flow through the wheels is computed from the gate openings and from power readings made at half-hour intervals. The height of water on the dam, in the fore bay, in the tailrace, and at the wasteways is read three times daily. The total electrical output is also measured twice a day.

Accuracy.—Owing to the extreme care with which the readings are made, winter and summer, the records at this station are considered valuable, particularly so since the dam was raised in 1908.

Daily discharge, in second-feet, of Deerfield River at Shelburne Falls, Mass., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	576	297	420	1,310	3,600	373	218	200	397	845	1,320	1,190
2	2,330	517	331	1,110	5,920	476	200	158	300	2,390	1,040	903
3	5,450	205	264	959	2,850	410	196	160	185	1,320	772	712
4	3,120	244	251	961	1,890	324	167	129	269	2,080	760	747
5	1,420	354	217	1,060	1,280	301	184	158	280	2,430	622	509
6	1,010	396	219	5,160	1,090	363	153	43	652	1,340	651	575
7	750	292	214	8,700	965	2,520	153	123	1,037	1,320	1,500	502
8	957	213	213	5,020	711	1,730	105	92	980	1,270	1,500	515
9	680	219	243	4,130	752	826	124	125	2,530	1,470	1,050	506
10	336	336	223	2,240	710	683	118	158	2,090	1,170	902	586
11	338	271	183	2,060	607	720	135	103	910	912	1,040	583
12	566	215	237	1,990	636	1,200	118	70	775	796	940	797
13	723	246	235	2,840	901	3,480	91	59	459	645	1,510	945
14	537	262	444	4,600	701	1,830	101	75	351	534	1,180	823
15	689	226	614	6,730	521	1,300	41	103	328	607	1,180	951
16	241	220	402	4,540	534	896	0	179	911	554	1,050	1,220
17	177	219	317	2,900	456	807	95	247	657	552	664	2,050
18	434	330	314	2,120	354	631	133	122	434	6,710	2,470	1,380
19	423	327	323	2,290	927	530	149	132	365	11,100	2,220	945
20	386	281	298	2,260	805	440	112	150	313	4,560	1,500	701
21	574	266	368	2,050	587	374	119	181	289	3,550	1,180	591
22	550	234	354	2,460	424	353	80	131	640	4,750	1,050	749
23	510	224	677	2,130	446	322	62	143	607	4,550	779	4,280
24	284	201	498	1,990	383	294	122	81	452	2,660	927	2,840
25	318	213	501	3,330	447	257	172	142	559	1,860	913	1,820
26	318	257	782	4,090	414	375	315	204	351	1,320	746	1,360
27	491	768	5,030	4,470	438	437	216	251	354	1,170	773	1,550
28	2,840	605	6,200	4,940	357	411	145	258	420	1,030	677	1,380
29	1,860	.....	3,510	4,710	302	308	242	1,730	648	947	3,120	794
30	1,510	.....	4,120	3,760	229	260	276	903	1,490	820	1,460	587
31	494	.....	1,360	.....	314	.....	253	639	.....	906	.....	912

Monthly discharge of Deerfield River at Shelburne Falls, Mass., for 1911.

[Drainage area, 501 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	5,450	177	997	1.99	2.29
February	768	201	301	.601	.63
March	6,200	183	947	1.89	2.18
April	8,700	959	3,230	6.45	7.20
May	5,920	229	986	1.97	2.27
June	3,480	257	774	1.55	1.73
July	315	0	148	.295	.34
August	1,730	43	234	.467	.54
September	2,530	185	668	1.33	1.48
October	11,100	534	2,130	4.25	4.90
November	3,120	622	1,180	2.36	2.63
December	4,280	502	1,100	2.20	2.54
The year	11,100	0	1,060	2.12	28.73

CHICOPEE RIVER TRIBUTARIES.

WARE RIVER NEAR WARE, MASS.

Location.—At the steel highway bridge about 2 miles above the village of Ware.

Records available.—September 15, 1904, to December 31, 1909.

Drainage area.—162 square miles.

Gage.—Chain, attached to the bridge; datum unchanged.

Channel.—Subject to changes as a result of the growth of grass and weeds during the summer.

Discharge measurements.—Made from the bridge or by wading.

Artificial control.—The nearest dam downstream is that of the Otis Co. at Ware, about 2½ miles below the gage. This dam causes backwater at the gage. Upstream, the nearest dam is at Gilbertville, a little over a mile distant. Gage heights fluctuate with the operations of the power plant above.

Winter flow.—The river does not, as a rule, freeze at the gaging section, but the relation between gage heights and discharge is affected by backwater caused by anchor ice and by ice jams that lodge on the river bottom below the gage.

Accuracy.—Seriously affected by operation of mills above, backwater from the mill below, and growth of grass in the channel during the summer. Accurate computation of the diurnal fluctuation of discharge caused by the operation of the mills above the station has been rendered impossible by insufficient funds. It is proposed to install an automatic gage to determine the relation between the daily gage heights heretofore recorded and the true mean gage height, thus making possible the publication of computations of daily discharge from the inception of the station to date. The gage heights for 1911 are withheld pending this investigation, as no gage heights recorded at this station are true indices of the daily discharge.

Cooperation.—Established in cooperation with the Otis Co. and the George H. Gilbert Mauufacturing Co. of Ware.

Discharge measurements of Ware River, near Ware, Mass., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 8[a]	F. J. Shuttleworth	2.56	140
Mar. 8[b]	C. S. De Golyer	2.60	163

[a] Measurements made at wading section, 100 feet above bridge.
[b] Measurements made from steel highway bridge, 2 miles above Ware.

SWIFT RIVER NEAR WEST WARE, MASS.

Location.—At the footbridge about 400 feet below a wooden dam near the West Ware station of the Athol branch of the Boston & Albany Railroad, about 6 miles by river downstream from Enfield.

Records available.—No records available; see below.

Drainage area.—Not measured.

Gages.—Standard chain, attached to the downstream side of the bridge; staff gage fastened to the crest of the dam.

Discharge measurements.—Made from the bridge or by wading below the dam. By means of the measurements and comparison of the gage heights it is expected that the dam can be rated.

Artificial control.—Relation between gage heights and discharge affected by the operation of power plants above the station. A power house used in conjunction with the dam at which records were for a short time obtained has been burned down.

Accuracy.—Conditions fairly good for making accurate current meter measurements. Accurate computation of the diurnal fluctuation of discharge caused by the operation of the mills above the station has been rendered impossible by insufficient funds. It is proposed to install an automatic gage to determine the relation between the daily gage heights heretofore recorded and the true mean gage heights, thus making possible the publication of accurate computations of daily discharge from the inception of the station to date. The gage heights for 1911 are withheld pending this investigation, as no gage heights recorded at this station are true indexes of the daily discharge.

The following discharge measurement was made by C. S. De Golyer:

March 9, 1911: Gage height, 3.21 feet; discharge 131 second-feet.

QUABOAG RIVER AT WEST BRIMFIELD, MASS.

Location.—At the highway bridge near the West Brimfield station on the Boston & Albany Railroad.

Records available.—August 23, 1909, to December 31, 1909.

Drainage area.—150 square miles.

Gage.—Staff attached to the bridge; read twice daily with and without the mills running; datum unchanged.

Discharge measurements.—Made from the bridge or by wading.

Winter flow.—Affected by ice.

Artificial control.—Low-stage gage heights show marked fluctuations during the day from the operations of the mills at and above West Warren.

Accuracy.—Conditions for making accurate discharge measurements are good. Accurate computation of the diurnal fluctuation of discharge caused by the operation of the mills above the station has been rendered impossible by insufficient funds. It is proposed to install an automatic gage to determine the relation between the daily gage heights heretofore recorded and the true mean gage heights, thus making possible the publication of accurate computations of daily discharge from the inception of the station to date. The gage heights for 1911 are withheld pending this investigation, as no gage heights recorded at this station are true indexes of the daily discharge

Cooperation.—Established in cooperation with the State of Massachusetts.

The following discharge measurement was made by C. S. De Golyer, by wading about 200 feet above the bridge:

March 7, 1911: Gage height, 2.45 feet; discharge, 191 second-feet.

WESTFIELD RIVER AT KNIGHTVILLE, MASS.

Location.—At the steel highway bridge (locally known as the Pitcher Bridge) at Knightville, about 4½ miles north of the town of Huntington, 1 mile north of the outlet of Norwich Lake and about 3 miles north of the junction with the middle branch of Westfield River.

Records available.—August 26, 1909, to December 31, 1911.

Drainage area.—162 square miles.

Gage.—Chain attached to the highway bridge; datum unchanged.

Discharge measurements.—Made from highway bridge.

Channel.—Rough. Bed composed of large gravel and ledge rock.

Artificial control.—No artificial backwater, as the fall between this station and the dam at Huntington is great.

Winter flow.—Relation between the gage heights and discharge during winter months affected by ice.

Accuracy.—Discharge rating curve fairly well defined by means of measurements in 1909–1911. It is stated, and a study of the daily gage height records tends to indicate that there is no mill control on this stream above the Knightville station; hence discharge data for open-water periods are considered reliable.

Cooperation.—Established in cooperation with the State of Massachusetts.

Discharge measurements of Westfield River at Knightville, Mass., for 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 10[a]	F. J. Shuttleworth	2.05	101
Apr. 14	W. G. Hoyt	3.32	873
14	W. G. Hoyt	3.29	848

[a] Measurements made under complete ice cover. Average thickness of ice 0.63 foot.

Daily gage height, in feet, of Westfield River at Knightville, Mass., for 1911.

[Observer, G. A. Fisk.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.10	.....	2.60	2.60	2.55	1.46	1.24	1.08	1.62	1.90	2.55	2.35
2	2.25	.....	2.60	2.35	3.10	1.37	1.20	1.00	1.52	2.50	2.30	2.20
3	3.20	.....	2.10	2.85	2.75	1.36	1.16	.96	1.42	2.25	2.30	2.15
4	2.70	2.20	1.72	2.95	2.65	1.44	1.12	.94	1.40	2.35	2.25	2.05
5	2.25	.....	.....	3.10	2.60	1.64	1.00	.90	1.32	2.25	2.20	1.72
6	2.00	.....	.....	3.80	2.50	1.99	.96	.89	1.36	1.98	2.60	1.94
7	1.85	1.85	.....	4.90	2.05	3.30	1.04	.88	1.28	1.96	2.40	1.92
8	1.88	.....	.....	3.90	2.05	3.20	1.02	.87	1.39	2.00	2.30	1.90
9	1.86	.....	.....	3.20	1.95	2.60	1.00	.86	1.53	1.95	2.25	1.91
10	1.88	.....	2.05	2.95	2.10	1.88	1.00	.86	1.60	1.85	2.20	1.94
11	1.82	.....	.....	2.80	2.00	1.90	.99	.85	1.75	1.78	2.20	2.05
12	1.82	.....	.....	2.65	1.86	1.94	.99	.84	1.64	1.73	2.20	2.05
13	1.83	1.60	.....	2.80	1.99	4.50	.96	.83	1.52	1.64	3.00	2.05
14	1.80	.....	2.95	3.10	1.92	3.40	.94	.82	1.34	1.57	2.80	1.98
15	.....	.....	.....	3.50	1.82	2.50	.96	.81	1.27	1.56	2.70	2.25
16	.....	.....	3.20	3.00	1.80	2.20	.94	1.60	1.46	1.50	2.65	3.20
17	.....	.....	3.40	3.00	1.71	1.72	1.06	1.45	1.40	1.50	2.60	3.70
18	1.80	.....	3.00	2.85	1.58	1.60	1.28	1.32	1.36	2.70	2.60	2.90
19	.....	.....	2.70	2.85	1.52	1.55	1.26	1.28	1.33	6.00	2.60	2.25
20	.....	.....	2.85	2.95	2.00	1.50	1.24	1.23	1.29	3.90	2.60	2.00
21	.....	.....	2.75	2.85	1.85	1.47	1.22	1.14	1.24	3.20	2.55	1.98
22	.....	1.55	2.80	2.75	1.76	1.43	1.02	.98	1.26	3.70	2.40	2.95
23	1.79	.....	3.00	2.65	1.69	1.41	.98	.92	1.22	3.90	2.00	4.00
24	.....	.....	2.90	2.45	1.58	1.36	1.13	.90	1.76	3.20	2.40	3.40
25	.....	.....	2.75	2.40	1.59	1.38	1.24	1.04	1.72	2.80	2.75	.....
26	.....	.....	2.85	2.25	1.66	1.46	1.28	1.24	1.76	2.65	2.70	2.35
27	3.30	3.00	2.45	2.70	1.66	1.49	1.23	1.42	1.24	2.50	2.60	2.85
28	2.65	2.80	3.40	2.80	1.60	1.48	1.26	1.63	1.34	2.40	3.20	2.40
29	2.10	.....	2.10	2.60	1.52	1.47	1.30	2.55	1.46	2.35	2.85	2.10
30	.....	.....	2.90	2.60	1.40	1.30	1.24	2.25	1.63	2.30	2.55	1.94
31	.....	.....	2.85	.....	1.35	.....	1.18	1.70	.....	2.25	.....	2.50

NOTE.—The extent of the ice periods is somewhat uncertain. It is probable, however, that the relation of gage height to discharge was affected by ice Jan. 1, 2, 9 to 26, 30, and 31, and Feb. 1 to about Mar. 27. Gage readings were probably to the water surface.

Daily discharge, in second-feet, of Westfield River at Knightville, Mass., for 1911.

Day.	Jan.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	.....	475	452	92	54	35	127	205	452	370
2	.....	.....	370	720	75	48	28	104	430	350	310
3	775	.....	595	545	73	44	25	84	330	350	292
4	520	.....	645	498	88	39	24	80	370	330	256
5	330	.....	720	475	132	28	21	66	330	310	153
6	238	.....	1,120	430	235	25	20	73	231	475	218
7	190	.....	1,820	256	830	32	20	60	225	390	212
8	199	.....	1,180	256	775	30	19	78	238	350	205
9	.....	.....	775	222	475	28	19	107	222	330	208
10	.....	.....	645	273	199	28	19	122	190	310	218
11	.....	.....	570	238	205	27	18	161	169	310	256
12	.....	.....	498	193	218	27	18	132	155	310	256
13	.....	.....	570	235	1,550	25	18	104	132	670	256
14	.....	.....	720	212	885	24	17	70	115	570	231
15	.....	.....	940	181	430	25	16	58	113	520	330
16	.....	.....	670	175	310	24	122	92	100	498	775
17	.....	.....	670	150	153	33	90	80	100	475	1,060
18	.....	.....	595	118	122	60	66	73	520	475	620
19	.....	.....	595	104	111	57	60	68	2,620	475	330
20	.....	.....	645	238	100	54	52	62	1,180	475	238
21	.....	.....	595	190	94	51	41	54	775	452	231
22	.....	.....	545	164	86	30	27	57	1,060	390	645
23	.....	.....	498	144	82	27	22	51	1,180	238	1,240
24	.....	.....	410	118	73	40	21	164	775	390	885
25	.....	.....	390	120	77	54	32	153	570	545	570
26	.....	.....	330	137	92	60	54	164	498	520	370
27	830	.....	520	137	98	52	84	54	430	475	595
28	498	885	570	122	96	57	130	70	390	775	390
29	273	273	475	104	94	63	452	92	370	595	273
30	.....	620	475	80	63	54	330	130	350	452	218
31	.....	595	.....	72	.....	46	147	.....	330	.....	430

NOTE.—Discharge determined from a discharge rating curve is fairly well defined below about 1,500 second-feet. Daily discharge during periods of probable ice conditions omitted.

Monthly discharge of Westfield River at Knightville, Mass., for 1911.

[Drainage area, 162 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	830	.....	207	1.28	1.48	C.
February	.....	.....	120	.747	.78	D.
March	885	.....	259	1.60	1.84	C.
April	1,820	330	654	4.04	4.51	A.
May	720	72	237	1.46	1.68	B.
June	1,550	63	264	1.63	1.82	B.
July	63	24	40.2	.247	.28	C.
August	452	16	66.0	.407	.47	C.
September	164	51	93.0	.574	.64	B.
October	2,620	100	474	2.93	3.38	A.
November	775	238	442	2.73	3.05	A.
December	1,240	153	408	2.52	2.90	A.
The year	2,620	16	272	1.69	22.83	

NOTE.—Discharge during periods in which ice existed estimated from climatologic records and by comparison with records of discharge of Deerfield River at Shelburne Falls. Mean discharge Jan. 1 to 2, estimated, 175 second-feet; Jan. 9 to 26, 105 second-feet; Jan. 30 and 31, 175 second-feet; Mar. 1 to 27, 210 second-feet.

MIDDLE BRANCH OF WESTFIELD RIVER AT GOSS HEIGHTS, MASS.

Location.—At a single-span highway bridge in the hamlet of Goss Heights, about 1½ miles north of the village of Huntington, and half a mile above the confluence of the Middle Branch with the North Branch of Westfield River.

Records available.—July 14, 1910, to December 31, 1911.

Drainage area.—53 square miles.

Gage.—Standard chain attached to the upstream side of the bridge; read twice daily.

Channel.—Conditions fair for making discharge measurements except at unusually low stages.

Discharge measurements.—Made from the bridge or by wading.

Artificial control.—The operation of the power plant 2 miles above the station probably has little effect on the relation between gage height and discharge at this point. It is therefore assumed that the average of the two daily readings gives the correct mean gage height for the day.

Cooperation.—Established in cooperation with the State of Massachusetts.

Discharge measurements of Middle Branch of Westfield River at Goss Heights, Mass., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 10[a]	C. S. De Golyer	1.89	27.2
Apr. 14	W. G. Hoyt	2.10	265

[a] Measurements made under complete ice cover. Average thickness of ice 0.77 foot.

Daily gage height, in feet, of Middle Branch of Westfield River at Goss Heights, Mass., for 1911.

[Monroe Rising, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	2.70	2.50	1.74	1.69	1.44	1.12	1.09	1.32	1.38	1.64	1.59
2	3.95	2.30	2.25	1.68	1.90	1.36	1.10	1.10	1.38	1.86	1.61	1.56
3	3.15	1.75	1.85	1.61	1.79	1.25	1.08	1.11	1.24	1.82	1.56	1.58
4	2.75	1.84	1.85	1.56	1.70	1.21	1.05	1.09	1.21	1.71	1.41	1.51
5	2.55	1.92	1.72	1.61	1.62	1.18	1.04	1.08	1.14	1.69	1.39	1.51
6	2.60	1.78	1.62	3.50	1.58	1.44	1.11	1.06	1.21	1.64	1.35	1.54
7	2.55	1.62	1.88	3.20	1.51	2.20	1.10	1.05	1.15	1.78	2.05	1.59
8	2.65	1.61	1.32	2.60	1.42	1.85	1.09	1.08	1.11	1.80	1.86	1.59
9	1.76	1.51	1.92	2.10	1.46	1.54	1.05	1.06	1.14	1.61	1.80	1.61
10	1.82	1.42	2.15	2.00	1.46	1.61	1.04	1.05	1.52	1.51	1.72	1.56
11	1.70	1.36	2.00	1.96	1.45	1.48	1.02	1.02	1.54	1.46	1.61	1.51
12	1.69	1.29	2.10	1.86	1.41	1.56	1.00	1.00	1.49	1.41	1.51	1.50
13	1.65	1.48	1.85	1.92	1.44	2.40	1.09	0.96	1.48	1.36	1.74	1.49
14	1.65	1.60	2.20	2.10	1.42	1.95	1.05	0.91	1.40	1.29	1.70	1.49
15	1.68	1.58	2.70	2.70	1.41	1.69	1.11	0.92	1.34	1.24	1.81	1.58
16	1.62	1.66	2.25	2.15	1.44	1.46	1.06	1.35	1.41	1.21	1.81	1.75
17	1.69	1.65	1.78	1.92	1.32	1.44	1.08	1.14	1.35	1.21	1.81	2.20
18	1.68	1.78	2.00	1.81	1.31	1.35	1.25	1.11	1.22	1.41	1.76	1.88
19	1.62	2.20	1.88	1.81	1.54	1.31	1.12	1.09	1.19	4.55	2.10	1.71
20	1.62	1.95	1.98	1.91	1.66	1.31	1.14	1.02	1.16	2.65	1.91	1.56
21	1.68	1.74	2.10	1.84	1.58	1.29	1.10	1.04	1.14	2.50	1.75	1.62
22	1.76	1.56	2.25	1.92	1.44	1.21	1.16	1.09	1.11	3.40	1.71	1.60
23	1.69	1.54	2.65	1.90	1.39	1.25	1.14	1.11	1.21	3.60	1.61	2.65
24	1.71	1.50	2.05	1.79	1.38	1.21	1.20	1.10	1.19	3.30	1.66	2.15
25	1.69	1.68	2.20	1.71	1.38	1.21	1.18	1 10	1.12	2.90	1.89	1.86
26	1.61	1.89	2.50	1.71	1.45	1.24	1.16	1.22	1.25	1.84	1.72	1.71
27	1.61	2.50	3.90	1.68	1.36	1.32	1.14	1.34	1.25	1.72	1.70	1.90
28	2.75	2.70	3.80	1.71	1.31	1.31	1.11	1.42	1.28	1.48	1.62	1.89
29	3.70	.....	2.70	1.81	1.32	1.29	1.18	1.52	1.25	1.51	1.58	1.81
30	2.25	.....	2.85	1.79	1.28	1.19	1.15	1.55	1.34	1.48	1.56	1.74
31	2.90	.....	2.00	.....	1.25	.....	1.11	1.48	.....	1.51	.....	1.71

NOTE.—There is some uncertainty regarding the extent of backwater from ice at this station. It is probable, however, that the relation of gage height to discharge was affected by ice Jan. 1 and Jan. 5 to Mar. 26. There was also slight backwater for a few days during December. Gage heights were probably read to water surface. Gage heights were probably not materially affected by control flow at the mills above the station.

Daily discharge, in second-feet, of Middle Branch of Westfield River at Goss Heights, Mass., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1				166	152	87	17	13	54	72	139	126
2	848			150	210	67	14	14	72	199	132	119
3	588			132	179	41	12	16	39	188	119	124
4	462			119	155	32	8.5	13	32	158	80	106
5				132	134	27	7.4	12	20	152	74	106
6				700	124	87	16	10	32	139	64	113
7				604	106	296	14	8.5	22	177	252	126
8				416	82	196	13	12	16	182	199	126
9				267	93	113	8.5	10	20	132	182	132
10				238	93	132	7.4	8.5	108	106	160	119
11				227	90	98	5.2	5.2	114	93	132	106
12				199	80	119	3	3	100	80	106	103
13				216	87	355	13	2.6	98	67	166	100
14				267	82	224	8.5	2.1	77	50	155	100
15				447	80	152	16	2.2	62	39	185	124
16				282	87	93	10	64	80	32	185	168
17				216	57	87	12	20	64	32	185	296
18				185	54	64	41	16	34	80	171	204
19				185	113	54	17	13	28	1,050	267	158
20				213	145	54	20	5.2	24	432	213	119
21				193	124	50	14	7.4	20	385	168	134
22				216	87	32	24	13	16	668	158	129
23				210	74	41	20	16	32	733	132	432
24				179	72	32	30	14	28	636	145	282
25				158	72	32	27	14	17	509	207	199
26				158	90	39	24	34	41	193	160	158
27			832	150	67	57	20	62	41	160	155	210
28			799	158	54	54	16	82	48	98	134	207
29			447	185	57	50	27	108	41	106	124	185
30			494	179	48	28	22	116	62	98	119	166
31			238	.....	41	.....	16	98	.....	106	.....	158

NOTE.—Daily discharge determined from a discharge rating curve fairly well defined below 300 second-feet. The discharge during periods when ice existed omitted, except during December, when the backwater was so slight as to be practically negligible.

Monthly discharge of Middle Branch of Westfield River at Goss Heights, Mass., for 1911.

[Drainage area, 53 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	848	.....	134	2.53	2.92	D.
February	.....	.....	35	.660	.69	D.
March	832	.....	141	2.66	3.07	C.
April	700	119	238	4.49	5.01	B.
May	210	41	96.4	1.82	2.10	A.
June	355	27	93.1	1.76	1.96	A.
July	41	3	16.2	.306	.35	C.
August	116	2.1	26.3	.496	.57	B.
September	114	16	48.1	.908	1.01	B.
October	1,050	32	231	4.36	5.03	B.
November	267	64	156	2.94	3.28	A.
December	432	100	159	3.00	3.46	A.
The year	1,050	2.1	115	2.17	29.45	

NOTE.—Discharge Jan. 1 and Jan. 5 to Mar. 26 estimated from the discharge at Knightville and climatologic records. Discharge Jan. 1 estimated 100 second-feet. Mean discharge Jan. 5 to 31 estimated at 80 second-feet; mean discharge Mar. 1 to 26, estimated at 60 second-feet.

WESTFIELD LITTLE RIVER NEAR BLANDFORD, MASS.

Location.—A short distance below Borden Brook at Cobble Mountain, near Blandford, Mass.

Records available.—July 13, 1905, to December 31, 1909. Records not yet made available for 1910 and 1911.

Drainage area.—43 square miles.

Gages.—Staff gages and a chain gage have been used to obtain gage heights. All gages referred to the same datum which has remained unchanged since the station was established.

Channel.—Conditions for obtaining accurate discharge data are good.

Discharge measurements.—Made from a car and cable or by wading.

Weir.—A sharp crested weir, about 30 feet long, capable of carrying a depth of flow of 1½ feet, was constructed a short distance below the current-meter station August 10, 1906, and was maintained with some interruptions until September, 1907, when it was destroyed by high water. The weir gage was read at approximately the same time as the current-meter gage, and comparative readings furnish considerable information as to the accuracy of the station records.

Winter flow.—Affected by ice.

Utilization of water.—Westfield Little River is used by the city of Springfield as a source of domestic water supply. A large storage reservoir has been built on the upper part of Borden Brook, and a concrete diversion dam near the corners of Russell, Westfield, and Granville. The water is then carried by a tunnel through the mountain, a distance of about a mile, to the filter plant at Mundale, whence it is taken through a steel pipe line to Springfield. A distributing reservoir about 5 miles from Springfield is provided at Provin Mountain, Westfield.

Accuracy.—An excellent discharge rating curve has been developed.

Cooperation.—Established and maintained in cooperation with the water board of the city of Springfield, through its engineer, E. E. Lochridge. Data for 1911 not yet available.

HOUSATONIC RIVER BASIN.

HOUSATONIC RIVER AT GAYLORDSVILLE, CONN.

Location.—At the covered wooden highway bridge at Gaylordsville, about 2 miles below the mouth of Tenmile River.

Records available.—October 24, 1900, to December 31, 1909.

Drainage area.—1,020 square miles.

Gage.—Chain attached to the bridge, read once each day, datum unchanged.

Channel.—Conditions for obtaining accurate discharge data are good.

Discharge measurements.—Made from a cable 1¼ miles below the gage, as the cross section at the bridge is unfavorable for accurate measurements.

Artificial control.—Upstream, the nearest dam is at Bulls Bridge. Downstream, the nearest dam is at New Milford, about 7 miles below the station. At high stages backwater from the dam below may slightly affect the relation between gage height and discharge. The operation of the power plants above the station greatly controls the low-stage flow; consequently, the daily gage heights do not correctly represent the averages for 24-hour periods.

Winter flow.—Affected by ice for short periods.

Accuracy.—A good discharge rating curve has been developed. Accurate computation of the diurnal fluctuation of discharge caused by the operation of the mills above the station has been rendered impossible by insufficient funds. It is proposed to install an automatic gage to determine the relation between the

daily gage heights heretofore recorded and the true mean gage heights, thus making possible the publication of accurate computations of daily discharge from the inception of the station to date. The gage heights for 1911 are withheld pending this investigation, as no gage heights recorded at this station are true indexes of the daily discharge.

Cooperation.—Observer paid by United States Weather Bureau from November to April.

HUDSON RIVER BASIN.

COMPARISON OF DISCHARGE OF STREAMS IN THE HUDSON RIVER BASIN.

The following records of discharge in the Hudson River drainage basin are published for the purpose of comparison and of analytical study and reference. The records for Hudson River published in Water-Supply Papers 241, 261, 281, and 301, which are assumed to be essentially correct, are used in the tables below, but certain sources of minor errors in the monthly mean discharge should be noted.

Hudson River at North Creek.—Same rating curve used 1907–1911.

Hudson River at Thurman.—Same rating curve used 1907–1911; all determinations of discharge exceeding about 8,000 second-feet, published 1907–1911, are about 1 to 5 per cent too low.

Hudson River at Corinth.—Records used as published on pages 136–137.

Hudson River at Mechanicville.—No change in published record except that 190 second-feet has been added to discharge May to November on account of diversion to Lake Champlain Canal.

Schroon River at Riverbank.—Correct rating curves used 1907–1911, except for discharge exceeding about 5,000 second-feet, for which the published figures are about 1 to 5 per cent too low for 1907–1909.

Sacandaga River at Wells.—Revised determinations published in Water-Supply Paper 281 used.

Sacandaga River at Northville.—Same curve for high stages from 1907–1910; two different curves used for low and medium stages. It is probable that the extreme low discharge at Northville in 1910 is considerably too high.

Sacandaga River at Hadley.—Records at this station are unsatisfactory most of the time on account of frequent log jams at and below the gage section. No change made in published records of discharge, although they are at times subject to considerable error.

The comparisons are made by means of ratios. As a guide or index to the normal ratios of discharge, the ratios of the drainage areas are also given. All drainage area ratios are less than unity, that is, in their determination the area of the upstream station is used as the numerator. Natural or artificial causes entirely apart from errors involved in collecting and compiling stream-flow data may, of course, make the ratio of monthly mean discharge depart widely from the ratio of drainage area. The amount of probable departure depends primarily on the magnitude of the ratio of the drainage areas. If the drainage area ratio were unity, all departures of monthly mean ratios from the drainage area ratio would be due to errors in the records. If the drainage area ratio were very small, little significance could be attached to very wide departure of the monthly mean discharge ratio from the drainage area ratio. In general, unless the discharge is controlled by artificial storage, the monthly mean discharge ratio should be lower than the drainage area ratio during the period when the streams are frozen, higher during the spring run-off, lower during the late summer and fall, higher during periods of high water, and lower during periods of low water. At certain times of the year the departure is likely to be considerable, on account of unequal distribution of precipitation and run-off. These inequalities are more evenly

balanced over large areas than over small ones. Monthly mean discharge ratios greater than unity are of course due to error in the records. For long periods, such as a year or more, the discharge ratio, as a rule, should be very nearly the same as the drainage area ratio, although there are many notable exceptions to this rule, particularly for ratios less than about 0.60.

The preceding statements apply only to dependent streams, streams whose discharge in the numerator of the ratio is also included in the denominator. Natural variations in conditions affecting run-off in adjacent independent drainage areas are so great as usually to render ratio comparisons of discharge of little value.

In investigating apparent discrepancies in the monthly mean discharge ratios, consideration should be given to the relative amount of precipitation in the partial areas and also to natural and artificial conditions affecting the discharge.

In view of the small amount of money available and the difficulties of determining the discharge of the upper Hudson and its principal tributaries—the Schroon and the Sacandaga—it is believed that the records are very good. The flow of all these streams is affected by ice for nearly four months of the year, after which comes log driving with more or less flushing to drive the logs downstream. Logs are stranded or jam on the shoals and bars and in many places these log jams affect the relation of gage height to discharge for several months, necessitating very frequent measurements to determine the discharge accurately. Nearly all faulty determinations of monthly mean discharge are too high on account of backwater caused by ice or logs at or below stations.

The ratios show that many errors remain in the published records of discharge even after all possible care and attention have been given to their elimination. Some of the records are far from satisfactory even for preliminary studies, but under present conditions it is impossible to improve them.

The Survey's work in this region and also in other parts of the country emphasizes the need of larger funds for use in determining accurately the daily discharge of the Hudson and its tributaries at various points when the proposed storage reservoirs are completed, in order that water users on that river shall not be unjustly taxed for supposed benefits which they may not really receive.

For the purpose of properly regulating the discharge in future years, the records of discharge obtained at the dams on the Hudson would probably not be as satisfactory as records obtained at current-meter stations, first, on account of possible bias of the power users, and, second, because the involved character of the determinations of discharge at power plants and the many assumptions and hypothetical formulas used make many of them far from trustworthy. For discharge records already obtained at dams on the Hudson, the reader is referred to the report of the New York State engineer and surveyor for 1910, pages 617 to 641. The two sets of records obtained at the Mechanicville stations appear good when compared with each other, but the records at Crockers Reef dam and Fort Edward appear very poor.

Comparisons, by monthly means, of discharge in the Hudson River drainage basin from 1904 to 1911.

	Hudson, North Creek.	Schroon, Riverbank.	North Creek + Riverbank.	Hudson, Thurman.	Sacandaga.			Thurman + Hadley.	Hudson.	
					Wells.	Northville.	Hadley.		Corinth.	Mechanicville + Lake Champlain Canal.[a]
Drainage area, sq. miles	804	534	1,340	1,550	263	740	1,050	2,600	2,730	4,500
1904.										
June									5,520	6,950
July									2,460	
August									3,030	
September									2,890	6,850
October									7,830	
November									2,840	4,830
December									2,080	3,920
1905.										
January									2,600	6,100
February									1,860	3,540
March									5,030	9,390
April									18,200	22,700
May									6,970	8,360
June									9,900	9,740
July									6,580	7,130
August									3,570	5,820
September									9,350	12,200
October									4,340	6,260
November									4,730	
December									4,790	
The year									6,490	
1906.										
January									6,400	9,310
February									3,950	7,650
March									4,580	9,000
April									16,200	20,600
May									10,400	13,600
June									6,120	9,480
July									3,880	5,970
August									2,020	3,670
September									1,870	3,260
October									2,210	3,560
November									3,150	5,320
December									2,380	4,870
The year									5,250	8,020
1907.										
January									6,240	10,300
February									2,110	4,140
March									6,510	9,570
April									13,100	16,600
May									11,100	14,100
June									3,670	5,750
July									2,650	4,310
August									1,720	2,580
September		184		1,520	172	550			2,800	6,340
October	2,120	545	2,660	2,980	479	2,000	2,260	5,240	6,220	9,750
November	2,530	1,530	4,060	4,530	936	3,420	4,160	8,630	10,200	14,200
December	1,970	1,130	3,100	3,580	749	3,050	3,040	6,620	7,710	12,000
The year									6,190	9,140

[a] Canal assumed in operation May to November inclusive and to be carrying 190 second-feet.

Comparisons, by monthly means, of discharge in the Hudson River drainage basin from 1904 to 1911—Continued.

	Hudson, North Creek.	Schroon, Riverbank.	North Creek + Riverbank.	Hudson, Thurman.	Sacandaga.			Thurman + Hadley.	Hudson.	
					Wells.	Northville.	Hadley.		Corinth.	Mechanicville + Lake Champlain Canal.[a]
1908.										
January	1,300	1,010	2,310	2,620	450	1,430	1,900	4,520	5,320	8,410
February	2,020	1,130	3,150	3,630	724	2,660	3,420	7,050	6,070	9,690
March	2,730	1,300	4,030	4,750	844	2,880	3,480	8,230	9,630	14,000
April	5,270	3,160	8,430	8,520	2,250	9,600	10,200	18,700	19,800	22,300
May	5,230	2,790	8,020	7,900	1,550	6,040	7,440	15,300	16,300	18,100
June	818	700	1,520	1,700	292	862	1,300	3,000	2,760	3,950
July	830	335	1,160	1,410	65.1	252	382	1,790	2,060	2,330
August	742	117	859	943	29.2	144	233	1,180	1,940	1,960
September	525	160	685	728	18.4	63.9	138	866	1,580	1,210
October	532	159	691	779	66.9	208	367	1,150	1,970	1,570
November	626	195	821	919	112	389	521	1,440	2,060	2,040
December	570	198	768	900	262	446	637	1,540	1,810	2,010
The year	1,770	938	2,710	2,900	554	2,080	2,500	5,400	5,930	7,300
1909.										
January	622	255	877	1,100	456	1,130	1,680	2,780	3,990	5,210
February	1,280	872	2,150	2,700	931	2,650	3,820	6,520	8,590	11,600
March	1,180	1,040	2,220	2,610	535	1,580	2,250	4,860	5,910	9,220
April	6,290	3,970	10,300	9,680	2,410	9,210	12,300	22,000	23,400	25,800
May	5,150	2,630	7,780	7,860	1,560	4,220	6,280	14,100	15,500	17,200
June	1,360	1,110	2,470	2,810	441	1,300	1,660	4,470	4,860	6,210
July	679	343	1,020	1,110	78.1	226	378	1,490	1,560	2,170
August	773	100	873	960	40.9	189	352	1,310	1,390	1,710
September	807	108	915	913	22.5	75.2	216	1,130	1,250	1,650
October	717	110	827	795	29.6	157	303	1,100	1,310	1,750
November	737	188	925	835	52.5	182	387	1,220	1,450	1,870
December	427	218	645	800	69.7	250	456	1,260	1,200	1,570
The year	1,670	912	2,580	2,680	546	1,760	2,510	5,190	5,820	7,160
1910.										
January	593	188	781	900	368	900	1,120	2,020	2,490	5,190
February	677	363	1,040	1,200	300	750	1,020	2,220	2,410	5,480
March	3,640	1,910	5,550	6,500	1,800	5,300	7,710	14,200	16,000	21,400
April	3,560	2,780	6,340	6,810	1,420	4,600	6,070	12,900	14,900	17,600
May	2,380	1,700	4,080	3,950	949	2,630	3,540	7,490	8,880	9,420
June	1,840	1,400	3,240	3,800	826	2,240	3,640	7,440	8,820	10,400
July	508	260	768	819	64.5	245	358	1,180	1,450	1,790
August	956	186	1,140	1,220	160	367	465	1,680	1,820	2,180
September	986	348	1,330	1,420	307	520	611	2,030	2,270	2,460
October	1,130	368	1,500	1,590	262	600	696	2,290	2,420	2,730
November	910	399	1,310	1,490	320	850	1,130	2,620	2,740	3,470
December	570	219	789	860	120	350	543	1,400	1,540	2,010
The year	1,480	843	2,320	2,550	575	1,620	2,240	4,790	5,490	7,010
1911.										
January	750	357	1,110	1,200	240	.....	1,030	2,230	2,640	5,270
February	685	250	935	1,000	170	.....	735	1,740	2,040	3,370
March	675	310	985	1,250	248	.....	1,250	2,500	2,790	5,780
April	3,570	2,130	5,700	7,000	1,550	.....	5,920	12,900	14,700	16,800
May	2,620	1,420	4,040	4,380	1,330	.....	2,930	7,310	8,770	9,450
June	1,230	625	1,860	1,880	594	.....	1,470	3,350	4,690	4,620
July	706	189	895	923	66.5	.....	296	1,220	1,490	1,550
August	791	99.2	890	862	33.1	.....	202	1,060	1,590	1,370
September	522	151	673	710	.....	.....	659	1,370	2,130	2,190
October	924	333	1,260	1,300	.....	.....	2,680	3,980	5,610	7,430
November	1,010	610	1,620	1,570	.....	.....	2,680	4,250	5,690	7,750
December	1,850	1,060	2,910	2,800	.....	.....	3,710	6,510	8,680	10,000
The year	1,280	628	1,910	2,070	.....	.....	1,970	4,040	5,060	6,300

[a] Canal assumed in operation May to November, inclusive, and to be carrying 190 second-feet.

Comparisons, by monthly ratios, of discharge in the Hudson River drainage basin from 1904–1911.

	North Creek+River bank. Thurman.	Wells. Northville.	Northville. Hadley.	Thurman+Hadley. Corinth.	Thurman+Hadley. Mechanicville.	Corinth. Mechanicville.
Drainage area ratio	0.86	0.36	0.70	0.95	0.58	0.61
1904.						
June						.79
July						
August						
September						.42
October						
November						.59
December						
1905.						
January						.43
February						.53
March						.54
April						.80
May						.83
June						1.02
July						.92
August						.61
September						.77
October						.69
November						
December						
1906.						
January						.69
February						.52
March						.51
April						.79
May						.76
June						.65
July						.65
August						.55
September						.57
October						.62
November						.59
December						.49
The year						.65
1907.						
January						.61
February						.51
March						.68
April						.79
May						.79
June						.64
July						.61
August						.67
September		.31				.44
October	.89	.24	.88	.84	.54	.64
November	.90	.27	.82	.85	.61	.72
December	.87	.25	1.00	.86	.55	.64
The year						.68
1908.						
January	.88	.31	.75	.85	.54	.63
February	.87	.27	.78	1.16	.73	.63
March	.85	.29	.83	.85	.59	.69
April	.99	.23	.94	.94	.84	.89
May	1.02	.26	.81	.94	.85	.90
June	.89	.34	.66	1.09	.76	.70
July	.82	.26	.66	.87	.77	.88
August	.91	.20	.62	.61	.60	.99
September	.94	.29	.46	.56	.72	1.31
October	.89	.32	.57	.58	.73	1.25
November	.89	.29	.75	.70	.71	1.01
December	.85	.59	.70	.85	.77	.90
Year	.93	.27	.83	.91	.74	.81

Comparisons, by monthly ratios, of discharge in the Hudson River drainage basin from 1904–1911—Continued.

	North Creek+ River bank. / Thurman.	Wells. / Northville.	Northville. / Hadley.	Thurman+ Hadley. / Corinth.	Thurman+ Hadley. / Mechanicville.	Corinth. / Mechanicville.
1909.						
January	0.80	0.40	0.67	0.70	0.53	0.77
February	.80	.35	.69	.76	.56	.74
March	.85	.34	.70	.82	.53	.64
April	1.06	.26	.75	.94	.85	.91
May	.99	.37	.67	.91	.82	.90
June	.88	.34	.78	.92	.72	.78
July	.92	.35	.60	.96	.69	.72
August	.91	.22	.54	.94	.77	.81
September	1.00	.30	.35	.90	.68	.76
October	1.04	.19	.52	.84	.63	.75
November	1.11	.29	.47	.84	.65	.78
December	.81	.28	.55	1.05	.80	.76
Year	.96	.31	.70	.89	.72	.81
1910.						
January	.87	.41	.80	.81	.39	.48
February	.87	.40	.73	.92	.40	.44
March	.85	.34	.69	.89	.66	.75
April	.93	.31	.76	.87	.73	.85
May	1.03	.36	.74	.84	.80	.94
June	.85	.37	.62	.84	.71	.85
July	.94	.26	.68	.81	.66	.81
August	.93	.44	.79	.92	.77	.83
September	.94	.59	.85	.89	.83	.92
October	.94	.44	.86	.95	.84	.89
November	.88	.38	.75	.96	.75	.79
December	.92	.34	.64	.91	.70	.77
Year	.91	.36	.72	.87	.68	.78
1911.						
January	.92			.84	.42	.50
February	.94			.85	.52	.61
March	.79			.90	.43	.48
April	.81			.88	.77	.88
May	.92			.83	.77	.93
June	.99			.71	.72	1.01
July	.97			.82	.79	.96
August	1.03			.67	.77	1.16
September	.95			.64	.63	.97
October	.97			.71	.54	.76
November	1.03			.75	.55	.73
December	1.04			.75	.65	.87
Year	.92			.80	.64	.80

HUDSON RIVER AT NORTH CREEK, N. Y.

Location.—At the highway bridge in the village of North Creek, immediately above the mouth of North Creek, which enters the Hudson from the right.

Records available.—September 21, 1907, to December 31, 1911. Data also in annual reports of the State Water Supply Commission and the State engineer and surveyor, and in the 1911 report of the State of New York Conservation Commission.

Drainage area.—804 square miles.

Gage.—Chain, read twice daily; datum, unchanged.

Channel.—Heavy gravel; considered fairly permanent.

Discharge measurements.—Made from the two-span steel highway bridge.

Artificial control.—The numerous lakes and ponds in the basin of the upper Hudson have a decided effect on the low-water flow; especially is this true of Indian Lake.[1] The use of these storage reservoirs in the spring in connection with log driving tends to vitiate the daily records at all the gaging stations. Where possible, allowance is made for the effect of logging operations.

[1] See Indian Lake at Indian Lake, N. Y., p. 140.

Winter flow.—Winters are severe in the northern part of the State and determinations of flow for the winter months are approximate because of ice.

Accuracy.—Discharge rating curve very well defined. Determinations of discharge for open-water periods considered excellent.

Cooperation.—Station established and maintained by United States Geological Survey in cooperation with the State Water Supply Commission of New York.

Discharge measurements of Hudson River at North Creek, N. Y., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Jan. 19[a]	F. J. Shuttleworth	4.46	728
Feb. 11[b]	C. C. Covert	4.40	709
28[c]	F. J. Shuttleworth	4.00	661
Apr. 7[d]	C. S. De Golyer	4.26	1,700
19	W. G. Hoyt	4.85	3,770
June 9	C. S. DeGolyer	3.37	1,360
July 13	G. H. Canfield	3.07	1,010
16	....do	3.12	1,020
Nov. 18[e]	F. Weber	3.04	902

[a] Partial ice cover; average thickness of ice, 1.2 feet.
[b] Partial ice cover; average thickness of ice, 1.4 feet.
[c] Complete ice cover; average thickness of ice, 1.3 feet.
[d] 95 per cent ice cover; average thickness of ice, 1.4 feet.
[e] Some floating ice and shore ice.

Daily gage height, in feet, of Hudson River at North Creek, N. Y., for 1911.

[Gilbert Dean, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.3	.....	.....	4.2	6.8	2.65	2.39	3.0	2.65	2.7	2.8	3.1
2	3.4	.....	.....	.....	7.8	3.2	2.38	2.97	2.15	2.75	2.9	3.1
3	3.3	.....	.....	.....	7.6	3.15	2.25	2.96	2.02	2.8	2.8	3.0
4	3.03	.....	3.5	.....	6.1	3.1	2.18	2.94	1.98	2.95	2.75	2.85
5	3.05	4.2	.....	.....	5.2	3.0	2.11	2.94	1.95	3.2	2.7	2.7
6	3.35	.....	.....	.....	3.8	3.2	2.06	2.94	2.28	3.4	2.7	2.8
7	3.4	.....	.....	4.26	4.6	3.2	2.7	2.94	2.7	3.3	2.75	2.7
8	3.7	.....	.....	4.4	3.75	3.3	2.8	2.94	3.0	3.3	3.3	2.7
9	3.75	.....	.....	4.3	3.95	3.4	2.8	2.92	3.1	3.2	3.6	2.69
10	.....	.....	.....	4.2	4.5	3.6	2.9	2.9	2.8	3.05	3.75	2.8
11	.....	4.4	3.9	4.2	3.9	3.6	3.1	2.91	2.6	3.0	3.65	3.15
12	.....	.....	.....	4.2	4.3	4.0	3.1	2.9	2.65	2.8	3.45	3.65
13	.....	.....	.....	4.3	4.2	4.2	3.05	2.89	2.46	2.7	3.55	5.1
14	3.5	.....	.....	.....	3.3	4.4	3.05	2.88	2.44	2.6	3.65	5.8
15	.....	.....	.....	.....	3.35	4.2	3.05	2.87	2.41	2.5	3.6	5.4
16	.....	.....	.....	5.5	2.38	4.3	3.1	2.86	2.55	2.48	3.3	4.8
17	.....	.....	.....	5.3	2.85	3.8	3.05	2.87	2.6	2.43	3.1	4.5
18	.....	4.2	3.8	4.9	4.4	3.6	2.95	2.86	2.7	2.55	3.05	4.1
19	.....	.....	.....	4.9	3.1	3.3	2.8	2.85	2.48	3.1	3.15	3.75
20	.....	.....	.....	4.9	2.65	3.05	2.75	2.85	2.4	3.4	3.15	3.5
21	4.2	.....	.....	5.2	3.45	2.9	2.75	2.84	2.3	3.35	3.05	3.3
22	.....	.....	.....	4.8	2.38	2.8	2.7	2.82	2.75	3.3	3.0	3.25
23	.....	.....	.....	4.7	3.4	2.7	2.7	2.8	2.75	3.25	3.0	3.85
24	.....	.....	.....	4.8	2.8	2.6	2.7	2.78	2.7	3.5	2.9	4.4
25	.....	4.0	3.6	5.3	3.4	2.5	2.7	2.78	2.75	3.55	2.75	4.3
26	.....	.....	.....	6.0	2.4	2.46	2.8	2.8	2.7	3.3	2.7	4.1
27	3.7	.....	.....	6.5	3.7	2.44	3.0	2.78	2.7	3.15	2.7	3.9
28	.....	.....	.....	6.6	3.5	2.7	3.0	2.8	2.65	3.0	2.6	3.65
29	.....	.....	.....	6.7	2.9	2.8	3.05	2.98	2.65	2.9	2.75	3.2
30	.....	.....	.....	6.3	2.8	2.42	3.0	3.3	2.65	2.85	3.1	3.15
31	.....	.....	.....	.....	2.6	.....	3.0	2.92	.....	2.75	.....	3.15

NOTE.—Relation of gage height to discharge affected by ice from Jan. 1 to Apr. 7. Probably no backwater during December. Gage heights were probably to the surface of the water. No notes regarding backwater from logs given by the observer.

Daily discharge, in second-feet, of Hudson River at North Creek, N. Y., for 1911.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	8,620	570	394	890	570	610	700	990
2	.....	11,600	1,100	388	860	268	655	790	990
3	.....	11,000	1,040	315	850	213	700	700	890
4	.....	6,690	990	281	830	198	840	655	745
5	.....	4,520	890	250	830	188	1,100	610	610
6	.....	1,920	1,100	229	830	330	1,350	610	700
7	1,700	3,290	1,100	610	830	610	1,220	655	610
8	1,900	1,840	1,220	700	830	890	1,220	1,220	610
9	2,100	2,160	1,350	700	810	990	1,100	1,620	602
10	2,300	3,100	1,620	790	790	700	940	1,840	700
11	2,500	2,080	1,620	990	800	530	890	1,700	1,040
12	2,570	2,740	2,240	990	790	570	700	1,420	1,700
13	2,740	2,570	2,570	940	781	436	610	1,550	4,300
14	3,000	1,220	2,920	940	772	424	530	1,700	5,930
15	4,000	1,280	2,570	940	763	406	460	1,620	4,970
16	5,200	388	2,740	990	754	495	448	1,220	3,680
17	4,740	745	1,920	940	763	530	418	990	3,100
18	3,880	2,920	1,620	840	754	610	495	940	2,400
19	3,880	990	1,220	700	745	448	990	1,040	1,840
20	3,880	570	940	655	745	400	1,350	1,040	1,480
21	4,520	1,420	790	655	736	340	1,280	940	1,220
22	3,680	388	700	610	718	655	1,220	890	1,160
23	3,480	1,350	610	610	700	655	1,160	890	2,000
24	3,680	700	530	610	682	610	1,480	790	2,920
25	4,740	1,350	460	610	682	655	1,550	655	2,740
26	6,430	400	436	700	700	610	1,220	610	2,400
27	7,770	1,770	424	890	682	610	1,040	610	2,080
28	8,050	1,480	610	890	700	570	890	530	1,700
29	8,330	790	700	940	870	570	790	655	1,100
30	7,220	700	412	890	1,220	570	745	990	1,040
31	.....	530	.....	890	810	.....	655	.....	1,040

NOTE.—Daily discharge determined from a well-defined discharge rating curve.

Monthly discharge of Hudson River at North Creek, N. Y., for 1911.

[Drainage area,[a] 807 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	.....	.....	750	0.930	1.07	C.
February	.....	.....	685	.849	.88	C.
March	.....	.....	675	.836	.96	C.
April	8,330	.....	3,570	4.42	4.93	A.
May	11,600	388	2,620	3.25	3.75	A.
June	2,920	412	1,230	1.52	1.70	A.
July	990	229	706	.875	1.01	A.
August	1,220	682	791	.980	1.13	A.
September	990	188	522	.647	.72	B.
October	1,550	418	924	1.14	1.31	A.
November	1,840	530	1,010	1.25	1.40	A.
December	5,930	602	1,850	2.29	2.64	A.
The year	11,600	188	1,280	1.59	21.50	

NOTE.—Discharge Jan. 1 to Apr. 7 estimated by means of 4 discharge measurements made with ice present, the discharge at other stations in the upper Hudson River basin, and climatologic records. In determining discharge for February, due allowance was made for effect of draft on storage at Indian Lake, amounting to about 170 second-feet. No material effect from storage during January and March.

Mean discharge Apr. 1 to 6 estimated 817 second-feet.

[a] Incorrect drainage area, it should be 804 square miles.

HUDSON RIVER AT THURMAN, N. Y.

Location.—At the Delaware & Hudson Railroad bridge leading from Thurman to Warrensburg, about 950 feet below the highway bridge to Warrensburg, about 2,000 feet below the mouth of Schroon River, and about 13 miles above the mouth of Sacandaga River, which enters from the right.

Records available.—September 1, 1907, to December 31, 1911; data also in annual reports of the New York State Water Supply Commission and the State engineer and surveyor, and the 1911 report of the State Conservation Commission of New York.

Drainage area.—1,550 square miles.

Gage.—Chain; read three times daily; datum unchanged.

Channel.—Sand and gravel; liable to shift.

Discharge measurements.—Made from the bridge.

Artificial control.—The influence of storage at Indian Lake and of mill control on Schroon River is observable at this station.

Winter flow.—Station discontinued during the winter months because of ice. Winter flow estimated from the determinations of combined flow at Riverbank and North Creek plus an estimated inflow between the two stations.

Accuracy.—Accuracy of the determinations to some extent impaired as the result of accumulations of logs at the control point below the section and also around the piers of the bridge. Discharge rating curve very well defined and determinations of flow during the open water season are considered fairly accurate.

Cooperation.—Station established by United States Geological Survey in cooperation with the State Water Supply Commission of New York. Gage heights, January to March and December 17 to 31, furnished by Albany office of United States Weather Bureau.

Discharge measurements of Hudson River at Thurman, N. Y., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
June 7[a]	G. H. Canfield	3.27	1,880
July 28[a]	do	2.88	984
28[a]	do	2.88	979
Sept. 2[a]	do	2.31	519
2[a]	Frank Weber	2.22	474
27[a]	G. H. Canfield	2.56	689
Nov. 13[a]	Frank Weber	3.58	2,140

[a] Log jams in river below bridge produced backwater effect at gage.

Daily gage height, in feet, of Hudson River at Thurman, N. Y., for 1911.

[S. H. Spencer, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.8	4.1	4.4	.....	6.40	2.85	2.55	2.88	2.75	2.90	3.05	5.30
2	4.2	4.2	4.4	.....	7.10	3.00	2.19	2.94	2.25	2.75	3.10	3.25
3	4.3	4.5	4.4	.....	6.90	2.85	2.26	2.82	1.95	2.70	2.90	3.20
4	4.2	4.4	4.3	.....	6.00	2.85	1.95	2.80	1.90	2.90	2.72	2.95
5	3.9	4.5	4.2	.....	5.70	2.85	2.37	2.85	2.00	3.10	2.95	3.00
6	3.8	4.5	4.4	.....	4.70	2.95	2.70	2.75	2.08	3.25	2.95	3.05
7	3.9	4.5	4.4	.....	5.20	3.25	2.75	2.77	3.05	3.25	3.05	2.95
8	3.8	4.5	4.3	.....	3.80	3.35	3.05	2.81	2.75	3.15	3.30	2.77
9	4.1	4.5	4.3	.....	4.50	3.45	2.80	2.75	3.25	3.25	3.65	2.90
10	4.0	4.5	4.3	.....	4.40	3.25	2.95	2.77	2.85	3.10	3.75	3.00

Daily gage height, in feet, of Hudson River at Thurman, N. Y., for 1911—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11	4.0	4.6	4.3	.....	4.40	3.30	3.10	2.77	2.85	2.95	3.70	3.20
12	4.0	4.5	3.9	.....	3.80	3.75	3.05	2.75	2.75	2.80	3.40	3.55
13	4.0	4.4	4.2	.....	3.60	3.95	2.95	2.74	2.60	2.55	3.40	4.50
14	4.0	4.6	4.0	.....	3.85	4.20	2.95	2.77	2.48	2.70	3.70	5.20
15	4.0	4.5	4.0	.....	3.55	3.95	3.00	2.76	2.43	2.27	3.65	5.00
16	4.0	4.5	4.0	.....	3.05	4.20	2.85	2.74	2.38	2.60	3.55	4.5
17	3.8	4.5	3.8	.....	3.00	3.75	3.10	2.72	2.45	2.41	3.25	4.3
18	3.8	4.3	3.9	.....	4.10	3.50	3.00	2.75	2.90	.....	3.35	4.1
19	4.0	4.4	3.8	.....	3.25	3.30	2.95	2.77	2.60	3.55	3.40	3.8
20	4.3	4.4	3.7	.....	2.95	3.15	2.75	2.62	2.41	3.55	3.45	3.6
21	4.3	4.7	3.6	.....	3.70	3.05	2.75	2.74	2.23	3.55	3.40	3.4
22	4.3	4.5	3.7	.....	3.30	3.00	2.65	2.67	2.65	3.35	3.25	3.4
23	4.3	4.4	3.7	.....	2.90	2.85	2.50	2.67	2.65	3.40	3.30	4.4
24	4.3	4.9	3.7	.....	3.20	2.75	2.70	2.63	2.60	3.55	3.20	4.5
25	4.3	4.5	3.7	.....	3.50	2.50	2.55	2.67	2.60	3.60	3.00	4.4
26	4.3	4.4	3.6	.....	3.70	2.65	2.60	2.66	2.60	3.45	2.90	4.5
27	4.2	4.5	4.0	.....	3.05	2.65	2.90	2.60	2.55	3.30	3.00	4.1
28	4.3	4.4	4.3	.....	3.15	2.65	2.90	2.75	2.50	3.20	2.95	4.0
29	4.2	.....	4.3	.....	2.95	2.95	2.95	2.91	2.55	3.05	3.10	3.5
30	4.0	.....	4.3	.....	2.74	2.65	2.75	2.97	2.60	3.10	3.35	3.5
31	4.1	.....	4.3	.....	2.75	.....	2.85	2.85	.....	3.05	.....	3.5

NOTE.—Relation of gage height to discharge affected by ice from January to March and probably during the first few days in April. There was no backwater from ice during December. It is not known whether readings during January to March were to water surface or to the top of the ice. Gage heights Jan. 1 to Mar. 31 and Dec. 17 to 31 were taken from the records of the United States Weather Bureau. During practically all the period from May to December backwater, caused by log jams below the gage, existed at this station. There may, however, have been no backwater during the first part of May and during December.

Daily discharge, in second-feet, of Hudson River at Thurman, N. Y., for 1911.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	11,100	1,380	788	978	845	1,000	1,190	6,780
2	13,200	1,660	509	1,050	485	845	1,260	1,500
3	12,600	1,380	554	912	358	800	1,000	1,410
4	9,920	1,380	375	890	340	1,000	818	1,060
5	9,020	1,380	632	945	375	1,260	1,060	1,120
6	6,020	1,560	945	845	407	1,500	1,060	1,190
7	7,520	1,840	1,010	863	1,190	1,500	1,190	1,060
8	3,480	2,040	1,460	901	845	1,340	1,580	863
9	5,440	2,260	1,070	845	1,500	1,500	2,300	1,000
10	5,150	1,840	1,060	863	945	1,260	2,510	1,120
11	5,150	1,940	1,260	863	945	1,060	2,400	1,410
12	3,480	2,960	1,190	845	845	890	1,770	2,080
13	2,990	3,460	1,060	836	715	678	1,770	4,430
14	3,610	4,140	1,060	863	626	800	2,400	6,480
15	2,870	3,460	1,120	854	591	495	2,300	5,880
16	1,760	4,140	945	836	558	715	2,080	4,430
17	1,660	2,960	1,260	818	605	577	1,500	3,870
18	4,290	2,370	1,120	845	1,000	600	1,680	3,340
19	2,180	1,940	1,060	863	715	2,080	1,770	2,620
20	1,560	1,640	845	732	577	2,080	1,880	2,190
21	3,230	1,460	845	836	475	2,080	1,770	1,770
22	2,290	1,380	758	775	758	1,680	1,500	1,770
23	1,470	1,140	640	775	758	1,770	1,580	4,150
24	2,070	1,010	800	740	715	2,080	1,410	4,430
25	2,750	740	678	775	715	2,190	1,120	4,150
26	3,230	890	715	766	715	1,880	1,000	4,430
27	1,760	890	1,000	715	678	1,580	1,120	3,340
28	1,960	890	1,000	845	640	1,410	1,060	3,090
29	1,560	1,300	1,060	1,010	678	1,190	1,260	1,980
30	1,200	890	845	1,080	715	1,260	1,680	1,980
31	1,220	.....	945	945	.....	1,190	.....	1,980

NOTE.—Daily discharge determined from three discharge-rating curves applied as follows: Curve 1, the 1910 curve, applied May 1 to June 6; curve 2, constructed from measurement made June 7, applied June 7 to July 9; curve 3, constructed from six discharge measurements made July to November, applied July 10 to Dec. 31. Discharge Oct. 18, estimated.

Monthly discharge of Hudson River at Thurman, N. Y., for 1911.

[Drainage area, 1,550 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	.....	.....	1,200	0.774	0.89	C.
February	.....	.....	1,000	.645	.67	C.
March	.....	.....	1,250	.806	.93	C.
April	.....	.....	7,000	4.52	5.04	C.
May	13,200	1,200	4,380	2.83	3.26	B.
June	4,140	740	1,880	1.21	1.35	C.
July	1,460	375	923	.595	.69	C.
August	1,080	715	862	.556	.64	C.
September	1,500	340	710	.458	.51	B.
October	2,190	495	1,300	.839	.97	B.
November	2,510	818	1,570	1.01	1.13	C.
December	6,780	863	2,800	1.81	2.09	C.
The year	13,200	340	2,070	1.34	18.17	

NOTE.—Monthly discharge January to April estimated from the combined flow at North Creek and Riverbank, plus an estimated inflow between Thurman and North Creek and Riverbank, effect of storage regulation at Indian Lake reservoir being given due consideration.

HUDSON RIVER AT CORINTH, N. Y.

Location.—One-half mile upstream from highway bridge crossing the Hudson at Corinth and one-half mile north of the Corinth post office, at the mouth of the second brook, upstream, tributary to the Hudson from the right; 5 miles by river below the village of Luzerne and 1½ miles above the dam of the International Paper Co. at Palmer Falls.

Records available.—June 1, 1904, to December 31, 1911.

Drainage area.—2,728 square miles.

Gage.—Vertical staff bolted to the left-hand abutment on the downstream side of the highway bridge over the brook. The gage is about 25 feet from low water line in Hudson River, but as there is practically no slope to the tributary stream low water readings can be considered fair. The zero of the gage, unchanged since established, is at the same elevation as the crest of the Palmer Falls dams, which is assumed as 100 feet.

Channel.—Permanent; composed of coarse gravel and bowlders; fairly straight for upward of 2 miles above the gage, and current sluggish. The river begins to bend to the left almost at the gage and in the next 1,000 feet turns nearly 90°, then flows straight for 200 or 300 feet to the head of a rocky reef, which is practically a control for the gage. In the 1,000 feet between the point of control and the three-span steel highway bridge that crosses the Hudson at this point the river falls 3 or 4 feet.

Discharge measurements.—At low and medium stages made from a boat or by wading just above the point of control and about 1,100 feet downstream from the gage; at high stages from the upstream side of the highway bridge.

Winter flow.—Ice forms in the river to a thickness of 2 or 3 feet in the vicinity of the gage and down to within 500 feet of the control. In a section at the control, however, the river is usually open and it is believed that there is no very marked effect from ice.

Artificial control.—The low-water flow is modified by release of stored water from Indian Lake and to some extent by release of water from other small ponds on the upper Hudson. The only dam on the main stream above the station is that which furnishes power to a paper mill at Luzerne, 5 miles above. Below the

bridge and on the left-hand side of the stream is a low dam built in November, 1905, by the Corinth Electric Power Co., to divert water to a small electric plant which furnishes light and power for the villages of Corinth and Palmer Falls. In September, 1909, a temporary brush dam was built at this point by the same company. The dam of the International Paper Co. is about one-half mile farther downstream. Neither dam affects the records at the gage.

Point of zero flow.—Soundings near the point of control indicate that there would be no flow past the gage if the water fell below 123 feet on the gage.

Accuracy.—Conditions are not entirely favorable for accurate determination of flow. During the greater part of the time log jams rest against the two bridge piers and often extend upstream above the point of control, causing back water at the gage. Construction work on the temporary brush dam in the fall of 1909 may have produced a slight effect at the gage. The discharge curve has been developed from measurements made by engineers of the United States Geological Survey and probably represents the discharge at the station fairly well for conditions unaffected by log jams or ice.

Cooperation.—Gage installed and gage heights furnished by the International Paper Co.

Discharge measurements of Hudson River at Corinth, N. Y., in 1905 to 1910.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
1905.		*Feet.*	*Sec.-ft.*	1910.		*Feet.*	*Sec.-ft.*
Sept. 11	C. C. Covert	125.90	1,670	Mar. 2	C. C. Covert	130.04	[a] 19,100
12	do	125.82	1,730	3	do	130.66	[a] 21,900
Nov. 1	do	126.12	[a] 2,580	4	do	130.62	[a] 22,100
1909.				7	do	129.93	[a] 15,900
June 19	C. C. Covert	127.02	[a] 5,770	9	F. G. Sargent	129.71	[a] 17,100
July 20	do	125.50	1,250	Apr. 22	W. G. Hoyt	128.90	[a] 13,800
Aug. 25	W. G. Hoyt	125.35	1,100	June 20	J. J. Phelan	127.62	6,820
				Aug. 10	Phelan and Carman	125.54	1,540
				Oct. 28	J. J. Phelan	126.68	2,950

[a] Measurements made from highway bridge. All other measurements made at boat section above bridge.

Daily gage heights, in feet, of Hudson River at Corinth, N. Y., for 1904–1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1904.												
1						127.41	127.06	125.96	125.76	128.00	127.08	125.98
2						126.96	126.51	125.96	125.84	127.88	126.82	125.82
3						126.71	126.21	125.96	126.02	127.50	126.72	125.85
4						126.51	126.11	125.96	126.22	127.26	126.68	125.70
5						126.76	126.31	125.96	126.32	127.02	126.59	125.88
6						126.96	126.46	126.96	126.22	126.78	126.40	125.92
7						128.11	126.31	126.76	126.20	126.55	126.45	125.99
8						127.01	126.16	126.26	126.10	126.35	126.39	125.94
9						128.76	126.01	125.91	126.02	126.28	126.28	125.94
10						128.76	125.86	125.81	126.02	126.35	126.20	125.84
11						128.81	125.96	125.81	125.95	126.95	126.22	125.82
12						128.56	125.91	125.76	125.98	127.36	126.35	125.75
13						128.06	126.21	125.66	125.92	127.30	126.20	125.84
14						127.66	126.36	125.66	125.88	127.28	126.21	125.82
15						127.31	126.16	125.71	126.11	126.95	126.12	125.80
16						127.11	126.11	125.66	126.15	126.74	126.15	125.78
17						126.91	126.01	125.66	125.89	126.60	126.08	125.76
18						126.61	126.01	125.66	126.08	126.55	126.05	125.78
19						126.41	125.86	125.66	126.18	126.32	126.08	125.78
20						126.21	125.86	125.46	126.08	126.30	125.92	125.76

Daily gage height, in feet, of Hudson River at Corinth, N. Y., for 1904–1911—Contd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1904.												
21	.....	.....	.....	.....	.....	126.26	125.76	127.51	126.06	126.85	125.95	125.82
22	.....	.....	.....	.....	.....	126.26	125.66	127.66	126.10	130.40	125.85	125.79
23	.....	.....	.....	.....	.....	126.26	125.66	127.82	126.10	130.84	125.92	125.78
24	.....	.....	.....	.....	.....	126.16	125.66	127.49	126.08	130.12	126.12	125.90
25	.....	.....	.....	.....	.....	126.06	125.76	127.02	126.14	129.40	126.18	125.82
26	.....	.....	.....	.....	.....	125.96	125.76	126.59	126.90	128.88	126.19	125.81
27	.....	.....	.....	.....	.....	125.96	125.91	126.32	127.07	128.40	125.78	125.92
28	.....	.....	.....	.....	.....	125.96	125.91	126.06	126.97	128.05	125.90	126.38
29	.....	.....	.....	.....	.....	126.01	126.31	125.94	126.76	127.88	125.78	126.50
30	.....	.....	.....	.....	.....	126.26	126.21	125.82	127.45	127.45	125.88	126.42
31	.....	.....	.....	.....	.....	.....	126.11	125.69	.....	127.22	.....	126.43
1905.												
1	126.45	125.90	125.77	133.60	128.51	126.49	128.02	127.92	126.14	126.60	126.62	127.05
2	126.52	125.94	125.80	132.90	128.80	126.42	128.52	127.63	126.10	126.58	127.09	126.87
3	126.50	125.91	125.78	131.82	128.11	126.27	129.72	127.26	126.94	126.56	127.17	127.44
4	126.41	125.85	125.79	130.98	128.49	126.19	129.94	126.95	128.50	126.54	127.16	127.95
5	126.18	125.79	125.77	131.00	128.18	126.05	129.40	126.70	130.02	126.46	127.16	127.83
6	125.92	125.83	125.77	131.58	128.02	126.16	129.11	126.40	130.03	126.36	127.20	127.74
7	126.10	125.82	125.74	131.50	127.82	126.58	128.50	126.38	129.73	126.27	127.41	127.72
8	126.28	125.84	125.74	130.80	127.76	127.18	128.08	126.63	129.16	126.28	127.70	127.50
9	126.39	125.84	125.76	130.05	127.88	128.20	127.61	126.57	128.65	126.28	127.54	127.38
10	126.36	125.82	125.76	129.55	127.74	129.07	127.42	126.46	128.14	126.21	127.56	127.14
11	126.32	125.82	125.76	129.50	127.73	127.98	127.06	126.30	127.72	126.01	127.22	126.74
12	126.28	125.82	125.74	129.98	127.52	127.65	127.05	126.22	127.61	126.50	126.96	126.52
13	126.27	125.88	125.74	130.08	127.56	127.78	126.84	126.14	127.78	127.68	126.95	126.64
14	126.26	125.81	125.74	130.08	127.42	127.96	126.69	126.13	127.46	127.40	126.96	126.56
15	126.19	125.80	125.74	129.88	127.06	127.67	126.56	126.17	127.15	127.10	126.88	126.22
16	126.18	125.80	125.72	129.65	127.66	127.27	126.52	126.58	126.96	126.89	126.82	126.08
17	126.19	125.80	125.70	129.20	127.32	126.98	126.42	127.28	126.90	126.78	126.78	126.06
18	126.16	125.80	125.72	128.70	127.35	128.70	126.54	127.06	127.56	126.62	126.68	126.06
19	126.12	125.78	125.74	128.28	127.18	128.88	126.66	126.82	128.63	126.60	126.54	126.16
20	126.12	125.82	126.35	127.92	127.10	129.48	126.65	126.44	128.83	126.96	126.38	126.40
21	126.08	125.80	126.52	128.05	127.03	129.88	126.48	126.36	129.42	127.30	126.20	126.46
22	126.08	125.84	126.63	129.52	127.18	130.18	126.32	126.15	128.99	127.22	126.20	126.63
23	125.96	125.80	126.58	129.72	126.83	129.72	126.14	126.06	128.52	127.12	126.22	126.94
24	125.91	125.80	126.56	129.60	126.76	129.11	126.10	125.98	128.08	126.95	126.26	126.80
25	125.89	125.78	126.72	129.32	126.53	128.52	126.24	125.90	127.66	126.82	126.27	126.54
26	125.92	125.78	127.20	128.78	126.72	128.48	126.17	125.84	127.34	126.70	126.29	126.50
27	125.86	125.80	128.02	128.78	126.72	129.16	126.06	125.72	127.10	126.57	126.29	126.44
28	125.84	125.78	128.88	128.28	126.74	129.29	126.04	125.72	126.95	126.48	126.26	126.37
29	125.84	.....	.....	128.10	126.76	128.96	125.99	125.66	126.82	126.77	126.28	126.43
30	125.92	.....	130.70	128.22	126.48	128.43	127.22	125.71	126.72	126.68	127.22	126.94
31	125.91	.....	132.50	.....	126.46	.....	127.56	126.00	.....	126.57	.....	127.12
1906.												
1	127.05	127.41	126.66	127.84	128.40	128.17	127.70	126.19	125.85	125.74	126.12	126.72
2	126.90	127.18	126.58	127.83	128.50	127.96	128.30	126.16	125.70	125.82	126.04	126.44
3	126.70	126.60	126.60	127.85	128.95	127.45	127.96	126.04	125.76	125.80	125.96	126.12
4	126.64	126.52	127.56	128.03	128.81	127.30	127.66	125.93	125.78	125.82	125.88	125.94
5	127.00	126.61	127.77	128.42	129.00	126.84	127.56	125.84	126.06	125.74	125.89	126.02
6	127.06	126.48	127.54	128.34	128.62	127.09	127.44	126.08	126.18	125.74	125.81	126.02
7	126.92	126.42	127.42	128.26	128.42	127.02	127.14	125.98	126.00	125.66	125.82	126.08
8	126.66	126.48	127.24	128.08	128.32	127.04	126.81	125.91	125.95	125.69	125.78	125.92
9	126.51	126.44	127.12	127.98	128.28	127.64	126.66	125.86	125.98	125.72	125.76	125.82
10	126.35	126.52	126.88	127.68	128.28	128.20	126.64	125.81	126.00	125.69	125.76	125.84
11	126.42	126.48	126.80	127.49	128.18	128.59	126.66	125.78	125.92	125.74	125.75	125.90
12	126.58	126.54	126.69	127.62	127.84	128.26	126.60	125.68	125.80	125.78	125.85	125.89
13	126.63	126.48	126.67	127.99	127.94	127.51	126.44	125.73	125.78	125.78	125.88	125.85
14	126.53	126.52	126.58	128.57	128.40	127.32	126.32	125.68	125.80	125.80	125.89	125.86
15	126.40	126.44	126.54	130.36	128.90	126.80	126.19	125.64	125.78	125.80	125.92	125.89
16	126.55	126.40	126.36	131.16	128.24	126.61	126.10	125.60	125.70	125.78	125.88	125.97
17	126.60	126.36	126.38	131.72	127.84	126.74	126.02	125.60	125.75	125.76	125.90	126.20
18	126.52	126.32	126.25	131.74	127.85	127.27	126.02	125.65	125.78	125.75	125.95	126.35
19	126.47	126.30	126.24	131.78	128.04	127.26	125.99	125.62	125.75	125.74	126.12	126.28
20	126.43	126.33	126.24	131.85	127.56	127.04	125.90	125.72	125.78	125.95	126.66	126.14
21	126.40	126.36	126.25	131.84	127.23	126.80	125.84	125.80	125.78	126.51	126.89	126.10
22	126.59	126.54	126.26	131.76	127.30	126.74	125.93	125.92	125.74	126.55	127.06	126.18
23	127.80	126.67	126.29	131.56	126.92	126.93	125.86	126.10	125.74	126.33	127.30	126.18
24	129.54	126.82	126.18	130.96	127.34	127.04	125.90	126.13	125.79	126.17	127.18	126.02
25	129.35	126.82	126.18	130.44	127.76	126.97	125.88	126.10	125.85	126.14	126.99	126.00

Daily gage height, in feet, of Hudson River at Corinth, N. Y., for 1904–1911—Contd.

Day.	Jan.	Feb	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1906.												
26	129.28	126.93	126.12	129.95	127.62	126.84	125.84	126.00	125.78	126.30	126.82	125.98
27	129.08	127.02	126.20	129.28	128.04	126.68	125.80	126.08	125.78	126.36	126.76	125.95
28	128.69	126.86	126.90	128.88	129.20	126.48	125.90	125.98	125.74	126.33	126.96	125.95
29	128.20	.....	127.40	128.66	128.92	126.38	125.98	126.08	125.70	126.35	126.97	125.94
30	127.82	.....	127.56	128.42	128.96	126.44	126.09	126.05	125.70	126.28	126.79	125.90
31	127.62	.....	127.91	.....	128.54	.....	126.15	125.94	.....	126.18	.....	126.10
1907.												
1	127.63	125.94	125.71	132.38	130.53	127.76	126.16	125.90	125.56	127.11	128.02	126.41
2	128.18	125.93	125.70	131.35	130.47	127.06	126.40	125.89	125.58	127.60	127.66	126.42
3	128.00	126.00	125.68	130.43	130.20	126.62	126.58	125.87	125.64	126.83	128.78	126.28
4	128.18	125.98	125.68	129.74	130.30	126.50	126.61	125.76	126.06	126.56	129.30	126.22
5	128.60	126.08	125.72	129.45	130.04	126.44	127.00	125.80	126.82	126.78	129.20	125.96
6	128.76	126.12	125.70	129.39	130.15	126.71	127.39	125.82	126.98	126.84	128.88	126.06
7	128.68	126.10	125.67	129.02	130.02	127.18	127.28	125.78	126.57	126.75	130.71	126.22
8	128.68	126.10	125.64	128.80	129.42	127.10	126.16	125.74	126.30	127.00	131.25	126.16
9	128.38	126.04	125.62	128.50	129.40	127.00	126.08	125.74	126.07	128.53	131.14	126.18
10	128.19	126.01	125.60	128.24	129.08	127.72	125.97	125.74	126.04	128.60	130.50	126.93
11	127.60	126.20	125.64	127.94	128.68	126.57	125.88	125.66	126.01	128.63	129.88	127.80
12	127.71	126.10	125.59	127.80	128.40	126.44	125.96	125.66	126.40	128.04	129.30	129.24
13	127.40	125.95	125.60	127.74	128.18	126.41	125.94	125.67	127.24	127.72	128.78	128.82
14	127.22	125.94	125.63	127.76	127.88	126.34	125.92	125.69	127.06	127.50	128.32	128.44
15	127.06	125.94	125.80	127.82	127.88	126.33	125.89	125.59	126.62	127.23	127.92	128.06
16	126.75	125.96	126.00	127.72	127.58	126.52	125.84	125.62	126.38	126.96	127.57	127.94
17	126.36	125.94	126.25	127.58	127.88	126.28	125.82	125.62	126.07	126.76	127.28	127.81
18	126.30	125.91	126.45	127.46	128.10	126.10	125.82	125.59	125.88	126.60	127.12	127.58
19	126.35	125.92	126.54	127.32	127.46	126.00	125.80	125.64	125.73	126.45	127.00	127.36
20	126.62	125.88	126.50	127.24	127.40	126.09	125.76	125.90	125.66	126.35	126.83	127.28
21	126.49	125.85	126.49	127.07	127.36	126.40	125.68	125.92	125.60	126.38	126.73	127.32
22	126.42	125.79	126.60	126.98	127.10	126.44	125.63	125.88	125.55	126.40	126.81	127.04
23	126.40	125.79	127.36	127.00	127.26	126.24	125.67	125.84	125.72	126.31	126.84	127.02
24	126.30	125.78	128.30	128.11	127.26	125.97	125.94	125.86	125.96	126.21	126.80	128.53
25	126.18	125.81	128.10	128.98	127.00	126.01	126.16	125.78	126.14	126.17	126.75	128.66
26	126.22	125.78	128.36	129.48	126.73	126.02	126.24	125.75	126.20	126.14	126.70	128.64
27	126.22	125.72	128.48	130.42	126.90	126.02	126.16	125.82	126.16	126.08	126.60	128.44
28	126.16	125.73	129.72	130.36	127.40	126.03	126.01	125.76	126.12	127.25	126.60	128.40
29	126.10	.....	130.92	130.44	127.35	126.00	125.99	125.74	126.22	128.92	126.56	128.44
30	126.08	.....	132.28	130.40	127.63	126.04	125.98	125.62	126.68	128.79	126.50	128.50
31	126.48	.....	132.94	.....	127.10	.....	125.96	125.57	.....	128.48	.....	128.85
1908.												
1	128.88	126.10	126.89	130.98	132.32	127.12	125.78	126.02	125.74	126.09	125.92	126.26
2	128.68	126.04	126.80	130.58	132.34	127.13	125.75	125.89	125.68	126.08	125.90	126.14
3	128.46	126.16	126.88	129.70	132.40	126.99	125.72	125.83	125.68	126.00	125.81	125.79
4	128.25	126.08	126.96	129.50	131.49	126.79	125.84	125.90	125.65	125.86	125.73	125.68
5	127.90	126.10	126.90	128.98	131.62	126.63	125.97	125.90	125.62	125.86	125.72	125.66
6	127.25	126.28	126.84	128.81	130.46	126.55	125.87	125.88	125.61	125.84	125.70	125.50
7	127.10	126.31	126.92	129.00	129.92	126.40	125.96	125.84	125.66	125.78	125.66	125.58
8	126.96	126.26	126.96	129.66	130.40	126.20	125.89	125.94	125.72	125.78	125.48	125.72
9	127.05	126.17	126.93	130.76	130.56	126.10	125.95	125.88	125.70	125.72	125.63	126.14
10	127.16	126.25	126.90	131.06	130.58	126.20	125.91	125.94	125.66	125.74	125.66	126.16
11	126.78	126.24	126.88	131.26	130.04	126.08	125.84	125.93	125.64	125.75	125.68	125.90
12	126.75	126.27	126.98	131.32	130.70	125.94	125.77	125.90	125.64	125.77	125.72	125.90
13	126.82	126.25	127.08	131.04	129.85	126.00	125.78	125.92	125.62	125.88	125.90	125.82
14	126.94	126.28	127.36	130.54	129.96	126.08	125.81	125.90	125.60	125.89	125.93	125.97
15	126.88	126.28	127.67	130.08	129.72	126.16	125.80	125.86	125.66	125.84	126.25	125.95
16	126.65	126.73	128.14	129.88	129.62	126.08	125.78	125.75	125.72	125.78	126.24	125.94
17	126.78	129.16	128.24	129.66	129.24	126.08	125.80	125.83	125.70	125.77	126.00	125.94
18	126.60	129.12	128.22	129.46	128.72	125.98	125.90	125.94	125.70	125.65	125.88	125.86
19	126.58	129.10	128.13	129.54	128.56	125.89	125.94	125.98	125.70	125.64	125.85	125.76
20	126.50	128.82	128.02	129.51	128.61	125.96	126.28	126.00	125.58	125.68	125.76	125.62
21	126.42	128.61	127.86	129.28	128.18	126.04	126.18	125.98	125.57	125.70	125.79	125.78
22	126.48	128.42	127.79	129.03	128.27	126.10	126.08	125.95	125.65	125.68	125.68	125.76
23	126.78	128.06	127.82	128.85	128.45	126.02	125.94	125.90	125.68	125.64	125.73	125.62
24	126.40	127.75	128.10	129.24	128.41	125.92	125.86	125.78	125.66	125.66	125.86	125.56
25	126.32	127.60	128.56	129.84	127.90	125.88	125.80	125.80	125.64	125.56	125.90	125.49
26	126.25	127.45	128.48	129.46	127.68	125.91	125.75	125.78	125.66	125.60	126.04	125.60
27	126.36	127.24	129.15	131.80	127.40	125.81	125.92	125.76	125.56	126.30	126.36	125.64
28	126.59	127.20	129.75	132.15	127.40	125.71	126.13	125.72	125.54	126.26	126.50	125.66
29	126.26	127.04	131.10	132.46	127.13	125.58	126.14	125.71	125.96	126.30	126.38	125.68
30	126.38	.....	131.50	131.87	127.02	125.64	126.12	125.62	125.98	126.35	126.31	125.62
31	126.10	.....	131.46	.....	127.14	.....	126.16	125.65	.....	126.26	.....	125.60

Daily gage height, in feet, of Hudson River at Corinth, N. Y., for 1904–1911—Contd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1909.												
1	125.60	126.96	128.86	127.50	129.71	127.08	125.78	125.54	125.54	125.63	125.42	125.68
2	125.56	126.70	128.53	127.72	130.16	126.85	125.74	125.49	125.5.	125.64	125.48	125.68
3	125.50	126.56	128.18	128.03	130.34	126.75	125.76	125.47	125.49	125.49	125.50	125.72
4	125.56	126.42	127.94	128.38	130.13	126.78	125.72	125.46	125.50	125.55	125.52	125.70
5	125.75	126.35	127.66	128.75	130.18	126.92	125.74	125.44	125.38	125.56	125.58	125.56
6	126.60	126.42	127.42	129.40	129.94	127.49	125.69	125.45	125.46	125.46	125.55	125.56
7	127.37	126.96	127.23	130.84	129.52	127.66	125.60	125.44	125.52	125.44	125.41	125.54
8	127.25	127.42	127.10	132.17	130.36	127.54	125.58	125.44	125.44	125.45	125.55	125.51
9	127.11	127.43	126.96	132.28	130.08	127.30	125.54	125.59	125.46	125.47	125.58	125.40
10	126.92	127.33	126.84	131.82	129.81	127.05	125.51	125.60	125.45	125.49	125.69	125.40
11	126.99	127.30	126.95	130.83	130.03	127.57	125.44	125.54	125.49	125.52	125.73	125.40
12	126.82	127.38	126.92	130.18	131.84	127.39	125.52	125.54	125.48	125.50	125.72	125.38
13	126.48	127.33	126.92	129.99	131.12	127.28	125.59	125.55	125.50	125.48	125.66	125.36
14	126.25	127.02	126.87	131.92	130.40	127.10	125.61	125.54	125.50	125.40	125.43	125.34
15	126.24	126.97	126.83	133.44	129.92	127.15	125.63	125.44	125.50	125.40	125.52	125.31
16	126.14	127.16	126.75	134.30	129.36	126.92	125.68	125.62	125.49	125.48	125.45	125.40
17	125.87	127.40	126.68	133.68	129.46	126.66	125.65	125.82	125.49	125.46	125.48	125.45
18	125.96	127.42	126.57	133.12	129.50	126.85	125.62	126.12	125.48	125.46	125.53	125.49
19	125.82	127.28	126.51	132.54	129.44	127.08	125.56	126.02	125.40	125.47	125.77	125.46
20	125.88	128.25	126.50	132.72	129.08	127.30	125.64	125.78	125.48	125.49	125.60	125.39
21	125.89	129.16	126.42	132.57	128.86	126.82	125.82	125.52	125.46	125.48	125.42	125.42
22	125.90	129.24	126.48	132.06	128.70	126.68	125.84	125.40	125.42	125.54	125.56	125.40
23	125.90	129.15	126.54	131.57	128.52	126.40	125.84	125.40	125.44	125.60	125.56	125.41
24	126.06	129.10	126.58	131.10	128.22	126.30	125.87	125.38	125.50	125.53	125.64	125.38
25	126.98	129.72	126.88	130.43	127.96	126.22	125.91	125.41	125.50	125.70	125.58	125.38
26	127.75	129.62	127.30	130.08	127.76	126.11	125.78	125.58	125.41	125.69	125.72	125.38
27	127.76	129.52	127.32	130.04	127.42	126.00	125.67	125.64	125.50	125.64	125.89	125.37
28	127.76	129.26	127.30	129.62	127.24	125.92	125.62	125.56	125.62	125.61	125.74	125.38
29	127.57	.....	127.32	129.57	127.33	125.90	125.54	125.48	125.64	125.58	125.90	125.37
30	127.43	.....	127.24	129.35	127.94	125.84	125.52	125.54	125.61	125.54	125.83	125.35
31	127.20	.....	127.26	.....	127.19	.....	125.58	125.55	.....	125.44	.....	125.34
1910.												
1	125.35	126.31	128.89	132.68	128.28	128.82	125.98	125.64	125.54	126.58	126.42	125.92
2	125.34	126.16	130.08	132.60	128.19	128.72	125.85	125.66	125.74	126.23	126.32	125.86
3	125.36	126.14	130.64	131.96	128.08	128.30	125.64	125.59	125.84	126.10	126.32	125.74
4	125.36	126.10	130.67	131.28	128.82	127.92	125.62	125.77	125.87	125.96	126.37	125.70
5	125.34	126.01	130.40	130.48	128.86	127.64	125.66	126.14	125.96	125.88	126.60	125.65
6	125.34	126.00	129.88	130.06	128.69	128.37	125.74	126.32	126.00	125.81	126.84	125.60
7	125.34	125.95	129.94	130.23	128.32	129.28	125.64	125.99	126.20	125.94	126.98	125.59
8	125.34	125.84	129.92	130.02	128.22	129.53	125.63	125.82	126.28	126.10	126.77	125.58
9	125.34	125.88	129.74	129.72	128.10	129.42	125.60	125.68	126.26	126.00	126.55	125.63
10	125.36	125.90	129.44	128.91	128.35	129.10	125.54	125.54	126.14	126.02	126.40	125.62
11	125.35	126.03	129.13	128.51	127.77	128.81	125.56	125.78	125.98	126.06	126.34	125.56
12	125.35	126.00	128.87	128.54	127.54	128.76	125.54	126.30	125.93	126.00	126.36	125.58
13	125.35	125.88	128.58	128.24	127.20	128.69	125.59	126.38	125.85	126.01	126.28	125.52
14	125.35	125.94	128.45	127.70	127.07	128.40	125.58	126.00	125.92	125.96	126.21	125.54
15	125.35	125.94	128.15	127.65	127.07	128.15	125.56	125.88	125.84	125.90	126.15	125.57
16	125.34	125.92	127.89	127.28	126.88	127.84	125.56	125.74	125.76	125.81	126.10	125.56
17	125.36	125.92	127.65	127.15	126.72	127.68	125.55	125.92	125.70	125.84	126.02	125.50
18	125.38	125.94	127.36	126.90	126.63	127.78	125.56	125.89	125.64	125.82	125.94	125.52
19	125.41	125.88	127.26	128.70	126.68	127.83	125.58	125.87	125.66	125.84	125.85	125.57
20	125.48	125.88	127.31	129.23	126.74	127.58	125.56	125.84	125.62	125.90	125.72	125.58
21	125.60	125.92	127.46	129.20	126.81	127.28	125.54	125.77	125.62	125.89	125.66	125.60
22	126.16	126.03	127.74	128.75	127.12	127.05	125.54	125.62	125.60	125.89	125.74	125.54
23	127.28	126.12	128.16	128.64	127.09	126.80	125.55	125.70	125.60	125.90	125.94	125.52
24	127.60	126.20	128.59	128.21	127.04	126.56	125.55	125.64	125.58	126.00	125.94	125.61
25	127.58	126.17	129.56	127.94	127.64	126.39	125.54	125.62	125.58	126.07	125.92	125.72
26	127.42	126.12	131.01	128.35	129.06	126.26	125.54	125.58	125.79	126.06	125.92	125.68
27	127.18	126.12	131.16	129.08	129.28	126.20	125.52	125.57	126.11	126.18	125.86	125.68
28	127.03	127.25	131.06	128.95	129.10	126.16	125.54	125.54	126.76	126.40	125.86	125.78
29	126.85	.....	131.28	128.65	128.70	126.12	125.57	125.54	127.36	126.65	125.88	125.80
30	126.58	.....	131.82	128.89	128.30	126.04	125.68	125.54	126.98	126.61	125.90	125.88
31	126.46	.....	132.40	.....	128.56	.....	125.62	125.54	.....	126.53	.....	125.95
1911.												
1	125.98	125.90	125.94	127.47	130.58	126.40	125.90	125.73	125.92	125.95	126.70	127.28
2	126.10	125.90	125.91	127.28	131.10	126.62	125.64	125.70	125.73	126.15	126.74	127.14
3	126.58	125.98	125.90	127.10	131.36	126.59	125.58	125.66	125.60	126.40	126.70	127.96
4	126.88	126.04	125.86	126.98	131.30	126.43	125.54	125.58	125.50	126.46	126.60	126.64
5	126.73	125.97	125.82	126.90	129.70	126.35	125.45	125.63	125.53	126.82	126.46	126.27

Daily gage height, in feet, of Hudson River at Corinth, N. Y., for 1904–1911—Contd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1911.												
6	126.56	125.98	125.84	127.14	129.56	126.46	125.50	125.61	125.60	127.02	126.38	126.30
7	126.51	125.97	125.84	128.26	128.62	126.82	125.48	125.62	125.96	127.01	126.58	126.45
8	126.41	125.96	125.82	128.88	128.10	127.28	125.63	125.67	126.22	127.06	127.04	126.38
9	126.38	125.95	125.80	128.80	127.90	127.38	125.66	125.66	126.42	127.08	127.56	126.38
10	126.34	125.96	125.80	128.83	127.52	127.08	125.61	125.61	126.76	126.95	127.52	126.42
11	126.20	125.94	125.79	129.00	127.95	127.00	125.70	125.62	126.66	126.74	127.54	126.66
12	126.20	125.88	125.76	128.98	127.46	127.08	125.72	125.65	126.42	126.58	127.36	127.14
13	126.16	125.90	125.79	129.14	127.42	127.38	125.70	125.62	126.24	126.40	127.56	128.09
14	126.14	125.90	125.86	129.54	127.48	128.10	125.69	125.59	126.08	126.26	127.68	129.25
15	126.12	125.87	125.92	129.96	126.54	128.10	125.68	125.59	125.94	126.14	127.60	129.25
16	126.08	125.84	126.00	130.52	126.89	127.98	125.67	125.58	125.88	126.00	127.42	128.85
17	125.94	125.82	126.02	130.52	126.49	127.65	125.72	125.57	125.97	125.98	127.10	128.73
18	125.84	125.83	126.00	130.17	126.86	127.28	125.74	125.58	125.93	126.18	127.06	128.61
19	125.83	125.86	125.95	129.84	127.10	126.99	125.64	125.66	125.91	128.02	127.66	128.34
20	125.91	125.93	125.95	129.68	126.54	126.70	125.63	125.59	125.78	128.34	127.66	127.86
21	126.02	125.94	125.94	129.68	126.52	126.50	125.54	125.62	125.67	128.24	127.52	127.52
22	126.02	125.91	125.93	129.63	126.70	126.36	125.51	125.66	125.68	128.02	127.30	127.32
23	125.97	125.89	126.02	129.34	126.30	126.20	125.44	125.62	125.84	128.10	127.04	128.13
24	125.91	125.88	126.07	129.15	127.00	126.12	125.48	125.61	125.83	128.16	126.92	129.04
25	125.92	125.89	126.06	129.20	126.56	125.98	125.52	125.63	125.79	128.18	126.83	129.23
26	125.92	125.81	126.08	129.66	126.98	125.93	125.46	125.64	125.82	127.88	126.62	129.03
27	125.92	125.88	126.50	130.04	126.42	125.94	125.52	125.60	125.78	127.58	126.62	128.76
28	126.02	125.94	127.40	130.33	127.34	126.06	125.68	125.70	125.73	127.26	126.59	128.62
29	126.04	.....	127.55	130.55	126.58	126.18	125.76	125.99	125.74	126.95	126.87	128.10
30	125.96	.....	127.64	130.60	126.46	126.05	125.76	126.26	125.82	126.76	127.21	127.58
31	126.00	.....	127.60	.....	126.33	.....	125.73	126.08	.....	126.61	.....	127.38

Daily discharge, in second-feet, of Hudson River at Corinth, N. Y., for 1904–1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1904.												
1	.....	.....	.....	.....	.....	6,900	5,540	2,140	1,730	9,410	5,620	2,190
2	.....	.....	.....	.....	.....	5,170	3,610	2,140	1,890	8,880	4,660	1,850
3	.....	.....	.....	.....	.....	4,280	2,740	2,140	2,280	7,270	4,310	1,910
4	.....	.....	.....	.....	.....	3,610	2,480	2,140	2,760	6,300	4,170	1,620
5	.....	.....	.....	.....	.....	4,450	3,010	2,140	3,040	5,390	3,870	1,970
6	.....	.....	.....	.....	.....	5,170	3,460	5,170	2,760	4,520	3,270	2,050
7	.....	.....	.....	.....	.....	9,900	3,010	4,450	2,710	3,740	3,420	2,210
8	.....	.....	.....	.....	.....	5,360	2,610	2,870	2,460	3,120	3,240	2,100
9	.....	.....	.....	.....	.....	12,900	2,250	2,030	2,280	2,930	2,930	2,100
10	.....	.....	.....	.....	.....	12,900	1,970	1,830	2,280	3,120	2,710	1,890
11	.....	.....	.....	.....	.....	13,100	2,140	1,830	2,120	5,140	2,760	1,850
12	.....	.....	.....	.....	.....	11,900	2,030	1,730	2,190	6,700	3,120	1,720
13	.....	.....	.....	.....	.....	9,670	2,740	1,550	2,050	6,460	2,710	1,890
14	.....	.....	.....	.....	.....	7,930	3,150	1,550	1,970	6,380	2,740	1,850
15	.....	.....	.....	.....	.....	6,500	2,610	1,640	2,480	5,140	2,510	1,810
16	.....	.....	.....	.....	.....	5,730	2,480	1,550	2,580	4,380	2,580	1,770
17	.....	.....	.....	.....	.....	4,990	2,250	1,550	1,990	3,900	2,410	1,730
18	.....	.....	.....	.....	.....	3,930	2,250	1,550	2,410	3,740	2,340	1,770
19	.....	.....	.....	.....	.....	3,300	1,930	1,550	2,660	3,040	2,410	1,770
20	.....	.....	.....	.....	.....	2,740	1,930	1,210	2,410	2,980	2,050	1,730
21	.....	.....	.....	.....	.....	2,870	1,730	7,310	2,370	4,770	2,120	1,850
22	.....	.....	.....	.....	.....	2,870	1,550	7,930	2,460	20,800	1,910	1,790
23	.....	.....	.....	.....	.....	2,870	1,550	8,620	2,460	23,000	2,050	1,770
24	.....	.....	.....	.....	.....	2,610	1,550	7,230	2,410	19,400	2,510	2,010
25	.....	.....	.....	.....	.....	2,370	1,730	5,390	2,560	15,900	2,660	1,850
26	.....	.....	.....	.....	.....	2,140	1,730	3,870	4,950	13,400	2,680	1,830
27	.....	.....	.....	.....	.....	2,140	2,030	3,040	5,580	11,200	1,770	2,050
28	.....	.....	.....	.....	.....	2,140	2,030	2,370	5,210	9,630	2,010	3,210
29	.....	.....	.....	.....	.....	2,250	3,010	2,100	4,450	8,880	1,770	3,580
30	.....	.....	.....	.....	.....	2,870	2,740	1,850	7,060	7,060	1,970	3,330
31	.....	.....	.....	.....	.....	.....	2,480	1,600	.....	6,150	.....	3,360

Daily discharge, in second-feet, of Hudson River at Corinth, N. Y., for 1904–1911—Contd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1905.												
1	3,420	2,010	1,750	37,500	11,700	3,550	9,500	9,060	2,560	3,900	3,970	5,500
2	3,640	2,100	1,810	33,800	13,000	3,330	11,800	7,810	2,460	3,840	5,650	4,840
3	3,580	2,030	1,770	28,100	9,900	2,900	17,400	6,300	5,100	3,770	5,960	7,020
4	3,300	1,910	1,790	23,700	11,600	2,680	18,500	5,140	11,700	3,710	5,920	9,190
5	2,660	1,790	1,750	23,800	10,200	2,340	15,900	4,240	18,900	3,460	5,920	8,660
6	2,050	1,870	1,750	26,800	9,500	2,610	14,500	3,270	18,900	3,150	6,070	8,270
7	2,460	1,850	1,700	26,400	8,620	3,840	11,700	3,310	17,500	2,900	6,900	8,190
8	2,930	1,890	1,700	22,800	8,360	5,990	9,760	4,000	14,700	2,930	8,100	7,270
9	3,240	1,890	1,730	19,000	8,880	10,300	7,720	3,800	12,400	2,930	7,430	6,780
10	3,150	1,850	1,730	16,600	8,270	14,300	6,940	3,460	10,000	2,740	7,520	5,840
11	3,040	1,850	1,730	16,400	8,230	9,320	5,540	2,980	8,190	2,250	6,150	4,380
12	2,930	1,850	1,700	18,700	7,350	7,890	5,500	2,760	7,720	3,580	5,170	3,640
13	2,900	1,970	1,700	19,200	7,520	8,440	4,730	2,560	8,440	8,020	5,140	4,040
14	2,870	1,830	1,700	19,200	6,940	9,230	4,210	2,540	7,110	6,860	5,170	3,770
15	2,680	1,810	1,700	18,200	5,540	7,970	3,770	2,640	5,880	5,690	4,880	2,760
16	2,660	1,810	1,660	17,100	7,930	6,340	3,640	3,840	5,170	4,910	4,660	2,410
17	2,680	1,810	1,620	14,900	6,540	5,250	3,330	6,380	4,950	4,520	4,520	2,370
18	2,610	1,810	1,660	12,600	6,660	12,600	3,710	5,540	7,520	3,970	4,170	2,370
19	2,510	1,770	1,700	10,700	5,990	13,400	4,100	4,660	12,300	3,900	3,710	2,610
20	2,510	1,850	3,120	9,060	5,690	16,300	4,070	3,390	13,200	5,170	3,210	3,270
21	2,410	1,810	3,640	9,630	5,430	18,200	3,520	3,150	16,000	6,460	2,710	3,460
22	2,410	1,890	4,000	16,500	5,990	19,700	3,040	2,580	13,900	6,150	2,710	4,000
23	2,140	1,810	3,840	17,400	4,700	17,400	2,560	2,370	11,800	5,770	2,760	5,190
24	2,030	1,810	3,770	16,800	4,450	14,500	2,460	2,190	9,760	5,140	2,870	4,590
25	1,990	1,770	4,310	15,500	3,680	11,800	2,820	2,010	7,930	4,660	2,900	3,710
26	2,050	1,770	6,070	12,900	4,310	11,600	2,640	1,890	6,620	4,240	2,950	3,580
27	1,930	1,810	9,500	12,900	4,310	14,700	2,370	1,660	5,690	3,800	2,950	3,390
28	1,890	1,770	13,400	10,700	4,380	15,400	2,320	1,660	5,140	3,520	2,870	3,180
29	1,890	.....	17,800	9,850	4,450	13,800	2,210	1,550	4,660	4,480	2,930	3,360
30	2,050	.....	22,300	10,400	3,520	11,300	6,150	1,640	4,310	4,170	6,150	5,100
31	2,030	.....	31,600	.....	3,460	.....	7,520	2,230	.....	3,800	.....	5,770
1906.												
1	5,500	6,900	4,100	8,710	11,200	10,200	8,100	2,680	1,910	1,700	2,510	4,310
2	4,950	5,990	3,840	8,660	11,700	9,230	10,800	2,610	1,620	1,850	2,320	3,390
3	4,240	3,900	3,900	8,750	13,700	7,060	9,230	2,320	1,730	1,810	2,140	2,510
4	4,040	3,640	7,520	9,540	13,100	6,460	7,930	2,080	1,770	1,850	1,970	2,100
5	5,320	3,930	8,400	11,300	14,000	4,730	7,520	1,890	2,370	1,700	1,990	2,280
6	5,540	3,520	7,430	10,900	12,200	5,650	7,020	2,410	2,660	1,700	1,830	2,280
7	5,020	3,330	6,940	10,600	11,300	5,390	5,840	2,190	2,230	1,550	1,850	2,410
8	4,100	3,520	6,230	9,760	10,800	5,470	4,630	2,030	2,120	1,600	1,770	2,050
9	3,610	3,390	5,770	9,320	10,700	7,850	4,100	1,930	2,190	1,660	1,730	1,850
10	3,120	3,640	4,880	8,020	10,700	10,300	4,040	1,830	2,230	1,600	1,730	1,890
11	3,330	3,520	4,590	7,230	10,200	12,100	4,100	1,770	2,050	1,700	1,720	2,010
12	3,840	3,710	4,210	7,760	8,710	10,600	3,900	1,580	1,810	1,770	1,910	1,990
13	4,000	3,520	4,140	9,370	9,150	7,310	3,390	1,680	1,770	1,770	1,970	1,910
14	3,680	3,640	3,840	12,000	11,200	6,540	3,040	1,580	1,810	1,810	1,990	1,930
15	3,270	3,390	3,710	20,600	13,500	4,590	2,680	1,510	1,770	1,810	2,050	1,990
16	3,740	3,270	3,150	24,600	10,500	3,930	2,460	1,440	1,620	1,770	1,970	2,160
17	3,900	3,150	3,210	27,500	8,710	4,380	2,280	1,440	1,720	1,730	2,010	2,710
18	3,640	3,040	2,840	27,600	8,750	6,340	2,280	1,530	1,770	1,720	2,120	3,120
19	3,490	2,980	2,820	27,800	9,590	6,300	2,210	1,480	1,720	1,700	2,510	2,930
20	3,360	3,070	2,820	28,200	7,520	5,470	2,010	1,660	1,770	2,120	4,100	2,560
21	3,270	3,150	2,840	28,200	6,190	4,590	1,890	1,810	1,770	3,610	4,910	2,460
22	3,870	3,710	2,870	27,700	6,460	4,380	2,080	2,050	1,700	3,740	5,540	2,660
23	8,530	4,140	2,950	26,700	5,020	5,060	1,930	2,460	1,700	3,070	6,460	2,660
24	16,600	4,660	2,660	23,600	6,620	5,470	2,010	2,540	1,790	2,640	5,990	2,280
25	15,600	4,660	2,660	21,000	8,360	5,210	1,970	2,460	1,910	2,560	5,280	2,230
26	15,300	5,060	2,510	18,600	7,760	4,730	1,890	2,230	1,770	2,980	4,660	2,190
27	14,400	5,390	2,710	15,300	9,590	4,170	1,810	2,410	1,770	3,150	4,450	2,120
28	12,500	4,810	4,950	13,400	14,900	3,520	2,010	2,190	1,700	3,070	5,170	2,120
29	10,300	.....	6,860	12,400	13,600	3,210	2,190	2,410	1,620	3,120	5,210	2,100
30	8,620	.....	7,520	11,300	13,800	3,390	2,440	2,340	1,620	2,930	4,560	2,010
31	7,760	.....	9,010	.....	11,800	.....	2,580	2,100	.....	2,660	.....	2,460
1907.												
1	7,810	2,100	1,640	31,000	21,400	8,360	2,610	2,010	1,370	5,730	9,500	3,300
2	10,200	2,080	1,620	25,600	21,100	5,550	3,270	1,990	1,410	7,680	7,930	3,330
3	9,410	2,230	1,580	20,900	19,800	3,970	3,840	1,950	1,510	4,700	12,900	2,930
4	10,200	2,190	1,580	17,500	20,300	3,580	3,930	1,730	2,370	3,770	15,400	2,760
5	12,100	2,410	1,660	16,100	19,000	3,390	5,320	1,810	4,660	4,520	14,900	2,140

Daily discharge, in second-feet, of Hudson River at Corinth, N. Y., for 1904–1911—Contd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
6	12,900	2,510	1,620	15,800	19,500	4,280	6,820	1,850	5,250	4,730	13,400	2,370
7	12,500	2,460	1,570	14,100	18,900	5,990	6,380	1,770	3,800	4,420	22,300	2,760
8	12,500	2,460	1,510	13,000	16,000	5,690	2,610	1,700	2,980	5,320	25,100	2,610
9	11,100	2,320	1,480	11,700	15,900	5,320	2,410	1,700	2,390	11,800	24,500	2,660
10	10,300	2,250	1,440	10,500	14,400	8,190	2,160	1,700	2,320	12,100	21,300	5,060
11	7,680	2,710	1,510	9,150	12,500	3,800	1,970	1,550	2,250	12,300	18,200	8,530
12	8,140	2,460	1,420	8,530	11,200	3,390	2,140	1,550	3,270	9,590	15,400	15,100
13	6,860	2,120	1,440	8,270	10,200	3,300	2,100	1,570	6,230	8,190	12,900	13,100
14	6,150	2,100	1,490	8,360	8,880	3,100	2,050	1,600	5,540	7,270	10,800	11,400
15	5,540	2,100	1,810	8,620	8,880	3,070	1,990	1,420	3,970	6,190	9,060	9,670
16	4,420	2,140	2,230	8,190	7,600	3,640	1,890	1,480	3,210	5,170	7,560	9,150
17	3,150	2,100	2,840	7,600	8,880	2,930	1,850	1,480	2,390	4,450	6,380	8,570
18	2,980	2,030	3,420	7,110	9,850	2,460	1,850	1,420	1,970	3,900	5,770	7,600
19	3,120	2,050	3,710	6,540	7,110	2,230	1,810	1,510	1,680	3,420	5,320	6,700
20	3,970	1,970	3,580	6,230	6,860	2,440	1,730	2,010	1,550	3,120	4,700	6,380
21	3,550	1,910	3,550	5,580	6,700	3,270	1,580	2,050	1,440	3,210	4,340	6,540
22	3,330	1,790	3,900	5,250	5,690	3,390	1,490	1,970	1,360	3,270	4,630	5,470
23	3,270	1,790	6,700	5,320	6,300	2,820	1,570	1,890	1,660	3,010	4,730	5,390
24	2,980	1,770	10,800	9,900	6,300	2,160	2,100	1,930	2,140	2,740	4,590	11,800
25	2,660	1,830	9,850	13,900	5,320	2,250	2,610	1,770	2,560	2,640	4,420	12,400
26	2,760	1,770	11,000	16,300	4,340	2,280	2,820	1,720	2,710	2,560	4,240	12,300
27	2,760	1,660	11,600	20,900	4,950	2,280	2,610	1,850	2,610	2,410	3,900	11,400
28	2,610	1,680	17,400	20,600	6,860	2,300	2,250	1,730	2,510	6,260	3,900	11,200
29	2,460	.....	23,400	21,000	6,660	2,230	2,210	1,700	2,760	13,600	3,770	11,400
30	2,410	.....	30,500	20,800	7,810	2,320	2,190	1,480	4,170	13,000	3,580	11,700
31	3,520	.....	34,000	.....	5,690	.....	2,140	1,390	.....	11,600	.....	13,300
1908.												
1	13,400	2,460	4,910	23,700	30,700	5,760	1,770	2,280	1,700	2,440	2,050	2,870
2	12,500	2,320	4,590	21,700	30,800	5,800	1,720	1,990	1,580	2,410	2,010	2,560
3	11,500	2,610	4,880	17,300	31,100	5,280	1,660	1,870	1,580	2,230	1,830	1,790
4	10,500	2,410	5,170	16,400	26,300	4,560	1,890	2,010	1,530	1,930	1,680	1,580
5	8,970	2,460	4,950	13,900	27,000	4,000	2,160	2,010	1,480	1,930	1,660	1,550
6	6,260	2,930	4,730	13,100	21,100	3,740	1,950	1,970	1,460	1,890	1,620	1,270
7	5,690	3,010	5,020	14,000	18,400	3,270	2,140	1,890	1,550	1,770	1,550	1,410
8	5,170	2,870	5,170	17,100	20,800	2,710	1,990	2,100	1,660	1,770	1,240	1,660
9	5,500	2,640	5,060	22,600	21,600	2,460	2,120	1,970	1,620	1,660	1,490	2,560
10	5,920	2,840	4,950	24,100	21,700	2,710	2,030	2,100	1,550	1,700	1,550	2,610
11	4,520	2,820	4,880	25,100	19,000	2,410	1,890	2,080	1,510	1,720	1,580	2,010
12	4,420	2,900	5,250	25,500	22,300	2,100	1,750	2,010	1,510	1,750	1,660	2,010
13	4,660	2,840	5,620	24,000	18,100	2,230	1,770	2,050	1,480	1,970	2,010	1,850
14	5,100	2,930	6,700	21,500	18,600	2,410	1,830	2,010	1,440	1,990	2,080	2,160
15	4,880	2,930	7,970	19,200	17,400	2,610	1,810	1,930	1,550	1,890	2,840	2,120
16	4,070	4,340	10,000	18,200	16,900	2,410	1,770	1,720	1,660	1,770	2,820	2,100
17	4,520	14,700	10,500	17,100	15,100	2,410	1,810	1,870	1,620	1,750	2,230	2,100
18	3,900	14,500	10,400	16,200	12,700	2,190	2,010	2,100	1,620	1,530	1,970	1,930
19	3,840	14,400	9,980	16,600	11,900	1,990	2,100	2,190	1,620	1,510	1,910	1,730
20	3,580	13,100	9,500	16,400	12,200	2,140	2,930	2,230	1,410	1,580	1,730	1,480
21	3,330	12,200	8,790	15,300	10,200	2,320	2,660	2,190	1,390	1,620	1,790	1,770
22	3,520	11,300	8,490	14,100	10,600	2,460	2,410	2,120	1,530	1,580	1,580	1,730
23	4,520	9,670	8,620	13,300	11,400	2,280	2,100	2,010	1,580	1,510	1,680	1,480
24	3,270	8,320	9,850	15,100	11,200	2,050	1,930	1,770	1,550	1,550	1,930	1,370
25	3,040	7,680	11,900	18,000	8,970	1,970	1,810	1,810	1,510	1,370	2,010	1,250
26	2,840	7,060	11,600	16,200	8,020	2,030	1,720	1,770	1,550	1,440	2,320	1,440
27	3,150	6,230	14,700	28,000	6,860	1,830	2,050	1,730	1,370	2,980	3,150	1,510
28	3,870	6,070	17,600	29,800	6,860	1,640	2,540	1,660	1,340	2,870	3,580	1,550
29	2,870	5,470	24,300	31,400	5,800	1,410	2,560	1,640	2,140	2,980	3,210	1,580
30	3,210	.....	26,400	28,300	5,390	1,510	2,510	1,480	2,190	3,120	3,010	1,480
31	2,460	.....	26,200	.....	5,840	.....	2,610	1,530	.....	2,870	.....	1,440
1909.												
1	1,440	5,170	13,300	7,270	17,400	5,620	1,770	1,340	1,340	1,490	1,140	1,580
2	1,370	4,240	11,800	8,190	19,600	4,770	1,700	1,250	1,300	1,510	1,240	1,580
3	1,270	3,740	10,200	9,540	20,500	4,420	1,730	1,220	1,250	1,250	1,270	1,660
4	1,370	3,330	9,150	11,100	19,400	4,520	1,660	1,210	1,270	1,360	1,300	1,620
5	1,720	3,120	7,930	12,800	19,700	5,020	1,700	1,170	1,080	1,370	1,410	1,370
6	3,900	3,330	6,940	15,900	18,500	7,330	1,600	1,190	1,210	1,210	1,360	1,370
7	6,740	5,170	6,190	23,000	16,500	7,930	1,440	1,170	1,300	1,170	1,130	1,340
8	6,260	6,940	5,690	29,900	20,600	7,430	1,410	1,170	1,170	1,190	1,360	1,290
9	5,730	6,980	5,170	30,500	19,200	6,460	1,340	1,420	1,210	1,220	1,410	1,110
10	5,020	6,580	4,730	28,100	17,900	5,500	1,290	1,440	1,190	1,250	1,600	1,110

Daily discharge, in second-feet, of Hudson River at Corinth, N. Y., for 1904–1911—Contd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1909.												
11	5,280	6,460	5,140	22,900	19,000	7,560	1,170	1,340	1,250	1,300	1,680	1,110
12	4,660	6,780	5,020	19,700	28,200	6,820	1,300	1,340	1,240	1,270	1,660	1,080
13	3,520	6,980	5,020	18,800	24,400	6,380	1,420	1,360	1,270	1,240	1,550	1,050
14	2,840	5,380	4,840	28,600	20,800	5,690	1,460	1,340	1,270	1,110	1,160	1,030
15	2,820	5,210	4,700	36,700	18,400	5,880	1,490	1,170	1,270	1,110	1,300	984
16	2,560	5,920	4,420	41,400	15,700	5,020	1,580	1,480	1,250	1,240	1,190	1,110
17	1,950	6,860	4,170	38,000	16,200	4,100	1,530	1,850	1,250	1,110	1,240	1,190
18	2,140	6,940	3,800	34,900	16,400	4,770	1,480	2,510	1,240	1,210	1,320	1,250
19	1,850	6,380	3,610	31,800	16,100	5,620	1,370	2,280	1,110	1,220	1,750	1,210
20	1,970	10,500	3,580	32,800	14,400	6,460	1,510	1,770	1,240	1,250	1,440	1,100
21	1,990	14,700	3,330	32,000	13,300	4,660	1,850	1,300	1,210	1,240	1,140	1,140
22	2,010	15,100	3,520	29,300	12,600	4,170	1,890	1,110	1,140	1,340	1,370	1,110
23	2,010	14,700	3,710	26,700	11,800	3,270	1,890	1,110	1,170	1,440	1,370	1,130
24	2,370	14,400	3,840	24,300	10,400	2,980	1,950	1,080	1,270	1,320	1,510	1,080
25	5,250	17,400	4,880	20,900	9,230	2,760	2,030	1,130	1,270	1,620	1,410	1,080
26	8,320	16,900	6,460	19,200	8,360	2,480	1,770	1,410	1,130	1,600	1,660	1,080
27	8,360	16,500	6,540	19,000	6,940	2,230	1,570	1,510	1,270	1,510	1,990	1,070
28	8,360	15,200	6,460	16,900	6,230	2,050	1,480	1,370	1,480	1,460	1,700	1,080
29	7,560	.....	6,540	16,700	6,580	2,010	1,340	1,240	1,510	1,410	2,010	1,070
30	6,980	.....	6,230	15,600	9,150	1,890	1,300	1,340	1,460	1,340	1,870	1,040
31	6,070	.....	6,300	.....	6,030	.....	1,410	1,360	.....	1,170	.....	1,030
1910.												
1	1,040	3,010	13,500	32,600	10,700	13,100	2,190	1,510	1,340	3,840	3,330	2,050
2	1,030	2,610	19,200	32,200	10,300	12,700	1,910	1,550	1,700	2,790	3,040	1,930
3	1,050	2,560	22,000	28,800	9,760	10,800	1,510	1,420	1,890	2,460	3,040	1,700
4	1,050	2,460	22,100	25,200	13,100	9,060	1,480	1,750	1,950	2,140	3,180	1,620
5	1,030	2,250	20,800	21,200	13,300	7,850	1,550	2,560	2,140	1,970	3,900	1,530
6	1,030	2,230	18,200	19,000	12,500	11,100	1,700	3,040	2,230	1,830	4,730	1,440
7	1,030	2,120	18,500	19,900	10,800	15,300	1,510	2,210	2,710	2,100	5,250	1,420
8	1,030	1,890	18,400	18,900	10,400	16,500	1,490	1,850	2,930	2,460	4,280	1,410
9	1,030	1,970	17,500	17,400	9,850	16,000	1,440	1,580	2,870	2,230	3,740	1,490
10	1,050	2,010	16,100	13,600	11,000	14,400	1,340	1,340	2,560	2,280	3,270	1,480
11	1,040	2,300	14,600	11,700	8,400	13,100	1,370	1,770	2,190	2,370	3,100	1,370
12	1,040	2,230	13,400	11,800	7,430	12,900	1,340	2,980	2,080	2,230	3,150	1,410
13	1,040	1,970	12,000	10,500	6,070	12,500	1,420	3,210	1,910	2,250	2,930	1,300
14	1,040	2,100	11,400	8,100	5,580	11,200	1,410	2,230	2,050	2,140	2,740	1,340
15	1,040	2,100	10,100	7,890	5,580	10,100	1,370	1,970	1,890	2,010	2,580	1,390
16	1,030	2,050	8,930	6,380	4,880	8,710	1,370	1,700	1,740	1,830	2,460	1,370
17	1,050	2,050	7,890	5,880	4,310	8,020	1,360	2,050	1,620	1,890	2,280	1,270
18	1,080	2,190	6,700	4,950	4,000	8,440	1,370	1,990	1,510	1,850	2,100	1,300
19	1,130	1,970	6,300	12,600	4,170	8,660	1,410	1,950	1,550	1,890	1,910	1,390
20	1,240	1,970	6,500	15,100	4,380	7,600	1,370	1,890	1,480	2,010	1,660	1,410
21	1,440	2,050	7,110	14,900	4,630	6,380	1,340	1,750	1,480	1,990	1,550	1,440
22	2,610	2,300	8,270	12,800	5,770	5,500	1,340	1,480	1,440	1,990	1,700	1,340
23	6,380	2,510	10,100	12,300	5,650	4,590	1,360	1,620	1,440	2,010	2,100	1,300
24	7,680	2,710	12,100	10,300	5,470	3,770	1,360	1,510	1,410	2,230	2,100	1,460
25	7,600	2,640	16,700	9,150	7,850	3,240	1,340	1,480	1,410	2,390	2,050	1,660
26	6,940	2,510	23,900	11,000	14,300	2,870	1,340	1,410	1,790	2,370	2,050	1,580
27	5,990	2,510	24,600	14,400	15,300	2,710	1,300	1,390	2,480	2,660	1,930	1,580
28	5,430	6,260	24,100	13,700	14,400	2,610	1,340	1,340	4,450	3,270	1,930	1,770
29	4,770	.....	25,200	12,400	12,600	2,510	1,390	1,340	6,700	4,070	1,970	1,810
30	3,840	.....	28,100	13,500	10,800	2,320	1,580	1,340	5,250	3,930	2,010	1,970
31	3,460	.....	31,100	.....	11,900	.....	1,480	1,340	.....	3,680	.....	2,120
1911.												
1	2,190	2,010	2,100	7,150	21,700	3,270	2,010	1,680	2,050	2,120	4,240	6,380
2	2,460	2,010	2,030	6,380	24,300	3,970	1,510	1,620	1,680	2,580	4,380	5,840
3	3,840	2,190	2,010	5,690	25,700	3,870	1,410	1,550	1,440	3,270	4,240	9,230
4	4,880	2,320	1,930	5,250	25,400	3,360	1,340	1,410	1,270	3,460	3,900	4,040
5	4,340	2,160	1,850	4,950	17,300	3,120	1,190	1,490	1,320	4,660	3,460	2,900
6	3,770	2,190	1,890	5,840	16,700	3,460	1,270	1,460	1,440	5,390	3,210	2,980
7	3,610	2,160	1,890	10,600	12,200	4,660	1,240	1,480	2,140	5,360	3,840	3,420
8	3,300	2,140	1,850	13,400	9,850	6,380	1,490	1,570	2,760	5,540	5,470	3,210
9	3,210	2,120	1,810	13,000	8,970	6,780	1,550	1,550	3,330	5,620	7,520	3,210
10	3,100	2,140	1,810	13,200	7,350	5,610	1,460	1,460	4,450	5,140	7,350	3,330
11	2,710	2,100	1,790	14,000	9,190	5,320	1,620	1,480	3,900	4,380	7,430	4,100
12	2,710	1,970	1,730	13,900	7,110	5,610	1,660	1,530	3,330	3,840	6,700	5,840
13	2,610	2,010	1,790	14,600	6,940	6,780	1,620	1,480	2,820	3,270	7,520	9,810
14	2,560	2,010	1,930	16,600	7,190	9,850	1,600	1,420	2,410	2,870	8,020	15,200
15	2,510	1,950	2,050	18,600	3,710	9,850	1,580	1,420	2,100	2,560	7,680	15,200

Daily discharge, in second-feet, of Hudson River at Corinth, N. Y., for 1904–1911—Contd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1911.												
16	2,410	1,890	2,230	21,400	4,910	9,320	1,570	1,410	1,970	2,230	6,940	13,300
17	2,100	1,850	2,280	21,400	3,550	7,890	1,660	1,390	2,160	2,190	5,690	12,700
18	1,890	1,870	2,230	19,600	4,810	6,380	1,700	1,410	2,080	2,660	5,540	12,200
19	1,870	1,930	2,120	18,000	5,690	5,280	1,510	1,550	2,030	9,500	7,930	10,900
20	2,030	2,080	2,120	17,200	3,710	4,240	1,490	1,420	1,770	10,900	7,930	8,790
21	2,280	2,100	2,100	17,200	3,640	3,580	1,340	1,480	1,570	10,500	7,350	7,350
22	2,280	2,030	2,080	17,000	4,240	3,150	1,290	1,550	1,580	9,500	6,460	6,540
23	2,160	1,990	2,280	15,600	2,980	2,710	1,170	1,480	1,890	9,850	5,470	9,980
24	2,030	1,970	2,390	14,700	5,320	2,510	1,240	1,460	1,870	10,100	5,020	14,200
25	2,050	1,990	2,370	14,900	3,770	2,190	1,300	1,490	1,790	10,200	4,700	15,100
26	2,050	1,830	2,410	17,100	5,250	2,080	1,210	1,510	1,850	8,880	3,970	14,100
27	2,050	1,970	3,580	19,000	3,330	2,100	1,300	1,440	1,770	7,600	3,970	12,900
28	2,280	2,100	6,860	20,400	6,620	2,370	1,580	1,620	1,680	6,300	3,870	12,200
29	2,320	.....	7,480	21,500	3,840	2,660	1,730	2,210	1,700	5,140	4,840	9,850
30	2,140	.....	7,850	21,800	3,460	2,340	1,730	2,870	1,850	4,450	6,110	7,600
31	2,230	.....	7,680	.....	3,070	.....	1,680	2,410	.....	3,930	.....	6,780

Monthly discharge of Hudson River at Corinth, N. Y., for 1904–1911.

[Drainage area, 2,730 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum	Mean.	Per square mile.		
1904.						
June	13,100	2,140	5,520	2.02	2.25	B.
July	5,540	1,550	2,460	.901	1.04	B.
August	8,620	1,210	3,030	1.11	1.28	B.
September	7,060	1,730	2,890	1.06	1.18	B.
October	23,000	2,930	7,830	2.87	3.31	C.
November	5,620	1,770	2,840	1.04	1.16	C.
December	3,580	1,620	2,080	.762	.88	C.
1905.						
January	3,640	1,890	2,600	.952	1.10	B.
February	2,100	1,770	1,860	.681	.71	B.
March	31,600	1,620	5,030	1.84	2.12	B.
April	37,500	9,060	18,200	6.67	7.44	B.
May	13,000	3,460	6,970	2.55	2.94	B.
June	19,700	2,340	9,900	3.63	4.05	D.
July	18,500	2,210	6,580	2.41	2.78	D.
August	9,060	1,550	3,570	1.31	1.51	C.
September	18,900	2,460	9,350	3.42	3.82	B.
October	8,020	2,250	4,340	1.59	1.83	A.
November	8,100	2,710	4,730	1.73	1.93	A.
December	9,190	2,370	4,790	1.75	2.02	C.
The year	37,500	1,550	6,490	2.38	32.25	
1906.						
January	16,600	3,120	6,400	2.34	2.70	B.
February	6,900	2,980	3,950	1.45	1.51	B.
March	9,010	2,510	4,580	1.68	1.94	B.
April	28,200	7,230	16,200	5.93	6.62	B.
May	14,900	5,020	10,400	3.81	4.39	B.
June	12,100	3,210	6,120	2.24	2.50	B.
July	10,800	1,810	3,880	1.42	1.64	B.
August	2,680	1,440	2,020	.740	.85	B.
September	2,660	1,620	1,870	.685	.76	B.
October	3,740	1,550	2,210	.810	.93	B.
November	6,460	1,720	3,150	1.15	1.28	B.
December	4,310	1,850	2,380	.872	1.01	B.
The year	28,200	1,440	5,250	1.92	26.13	

Monthly discharge of Hudson River at Corinth, N. Y., for 1904–1911—Continued.

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	12,900	2,410	6,240	2.29	2.64	B.
February	2,710	1,660	2,110	.773	.80	B.
March	34,000	1,420	6,510	2.38	2.74	B.
April	31,000	5,250	13,100	4.80	5.36	B.
May	21,400	4,340	11,100	4.07	4.69	B.
June	8,360	2,160	3,670	1.34	1.50	B.
July	6,820	1,490	2,650	.971	1.12	B.
August	2,050	1,390	1,720	.630	.73	B.
September	6,230	1,360	2,800	1.03	1.15	B.
October	13,600	2,410	6,220	2.28	2.63	B.
November	25,100	3,580	10,200	3.74	4.17	B.
December	15,100	2,140	7,710	2.82	3.25	B.
The year	34,000	1,360	6,190	2.27	30.78	
1908.						
January	13,400	2,460	5,320	1.95	2.25	B.
February	14,700	2,320	6,070	2.22	2.39	B.
March	26,400	4,590	9,630	3.53	4.07	B.
April	31,400	13,100	19,800	7.25	8.09	B.
May	31,100	5,390	16,300	5.97	6.88	B.
June	5,800	1,410	2,760	1.01	1.13	C.
July	2,930	1,660	2,060	.755	.87	C.
August	2,280	1,480	1,940	.711	.82	D.
September	2,190	1,340	1,580	.579	.65	D.
October	3,120	1,370	1,970	.722	.83	D.
November	3,580	1,240	2,060	.755	.84	D.
December	2,870	1,250	1,810	.663	.76	D.
The year	31,400	1,240	5,930	2.17	29.58	
1909.						
January	8,360	1,270	3,990	1.46	1.68	B.
February	17,400	3,120	8,590	3.15	3.28	B.
March	13,300	3,330	5,910	2.16	2.49	B.
April	41,400	7,270	23,400	8.57	9.56	A.
May	28,200	6,030	15,500	5.68	6.55	A.
June	7,930	1,890	4,860	1.78	1.99	A.
July	2,030	1,170	1,560	.571	.66	A.
August	2,510	1,080	1,390	.509	.59	A.
September	1,510	1,080	1,250	.458	.51	B.
October	1,620	1,110	1,310	.480	.55	B.
November	2,010	1,130	1,450	.531	.59	B.
December	1,660	984	1,200	.440	.51	B.
The year	41,400	984	5,820	2.13	28.74	
1910.						
January	7,680	1,030	2,490	0.912	1.05	B.
February	6,260	1,890	2,410	.883	.92	B.
March	31,100	6,300	16,000	5.86	6.76	A.
April	32,600	4,950	14,900	5.46	6.09	A.
May	15,300	4,000	8,880	3.25	3.75	B.
June	16,500	2,320	8,820	3.23	3.60	B.
July	2,190	1,300	1,450	.531	.61	C.
August	3,210	1,340	1,820	.667	.77	A.
September	6,700	1,340	2,270	.832	.93	B.
October	4,070	1,830	2,420	.886	1.02	C.
November	5,250	1,550	2,740	1.00	1.12	A.
December	2,120	1,270	1,540	.564	.65	A.
The year	32,600	1,030	5,490	2.01	27.27	
1911.						
January	4,880	1,870	2,640	0.967	1.11	B.
February	2,320	1,830	2,040	.747	.78	B.
March	7,850	1,730	2,790	1.02	1.18	B.
April	21,800	4,950	14,700	5.38	6.00	B.
May	25,700	2,980	8,770	3.21	3.70	B.
June	9,850	2,080	4,690	1.72	1.92	D.
July	2,010	1,170	1,490	.546	.63	D.
August	2,870	1,390	1,590	.582	.67	D.
September	4,450	1,270	2,130	.780	.87	D.
October	10,900	2,120	5,610	2.05	2.36	D.
November	8,020	3,210	5,690	2.08	2.31	D.
December	15,200	2,900	8,680	3.18	3.67	D.
The year	25,700	1,170	5,060	1.85	25.20	

HUDSON RIVER AT MECHANICVILLE, N. Y.

Location.—At the Duncan dam of the West Virginia Pulp & Paper Co., in the village of Mechanicville, about 3,700 feet above the mouth of Anthony Kill (coming in from the right), 1¼ miles below the mouth of Hoosic River (coming in from the left), and about 19 miles above the mouth of Mohawk River, which enters from the right at Cohoes.

Records available.—1896 to 1911. Data also in annual reports of the State engineer and surveyor of New York, of the State Water Supply Commission of New York, and (for 1911) the first annual report of the State of New York Conservation Commission.

Drainage area.—4,500 square miles.

Gage.—Recording gage installed at the dam in the summer of 1910 for the purpose of obtaining a more accurate register of the daily flow over the crest of the dam; previous to 1910 two gage readings daily on the crest of the dam.

Discharge measurements.—Determinations of discharge for periods previous to the summer of 1910 computed by using two daily gage readings on the crest of the dam and continuous record of the run of the wheels in the adjoining paper mill. In 1904 the dam was raised and a concrete crest and apron were added, so that it now has a rounded or ogee section. A discharge curve has been calculated by means of coefficients derived from the United States Geological Survey experiments on dams of ogee section.

Accuracy.—Records at this station are very carefully made and may be considered good for this type of station.

Cooperation.—Records are computed and furnished by Mr. R. P. Bloss, engineer of the West Virginia Pulp & Paper Co.

The records which have been kept at this station since 1888 are among the longest in the State. They have been used as basic data in all studies of storage problems on the upper Hudson. In using these records it should be remembered that water is diverted past this station in the Champlain Canal.

Daily discharge in second-feet of Hudson River at Mechanicville, N. Y., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	a2,989	3,648	4,711	10,097	23,150	3,313	1,798	2,038	2,687	a 489	6,386	8,867
2	4,340	2,761	3,794	a 8,047	22,894	2,969	a2,389	1,770	1,251	1,991	6,172	7,539
3	13,137	4,522	3,922	8,720	26,241	3,507	2,359	1,368	a1,439	3,230	5,908	a 5,756
4	14,021	2,474	3,761	7,481	24,834	a2,436	1,972	1,472	2,028	3,034	5,629	7,459
5	9,415	a4,302	a1,695	7,061	20,943	4,113	1,493	1,317	1,027	3,823	a 3,917	4,985
6	7,554	3,279	2,158	13,543	15,808	3,478	1,492	a 391	1,746	4,838	6,644	4,633
7	6,587	4,123	3,737	16,775	a11,293	3,072	1,650	994	1,446	4,906	5,029	4,344
8	a5,571	3,276	2,796	19,541	14,434	4,349	1,284	1,706	1,688	a 4,305	6,503	4,434
9	7,394	3,291	1,882	a16,937	9,258	5,229	a 670	1,444	2,035	5,566	7,448	5,055
10	5,920	3,401	2,592	17,207	9,643	5,654	924	1,143	a3,080	5,283	8,447	a 3,495
11	5,461	3,870	3,110	17,119	7,632	a3,274	1,154	1,088	6,507	4,797	7,864	5,896
12	5,125	a3,356	a1,633	16,027	7,916	5,498	1,393	1,337	4,148	4,488	a 5,759	5,924
13	4,292	2,763	1,892	15,877	7,186	5,241	1,548	a 368	3,626	4,045	12,149	7,420
14	3,894	2,785	4,142	16,812	a 4,898	6,822	1,133	1,070	3,772	4,367	9,506	11,575
15	a3,759	2,779	4,051	22,033	7,821	9,402	1,587	1,581	3,641	a 1,854	9,642	14,133
16	5,318	2,683	8,500	a23,628	5,279	9,007	a 600	1,137	3,163	2,988	7,769	13,273
17	3,414	2,203	5,162	24,638	5,469	8,946	1,460	1,709	a 718	2,984	7,370	a13,709
18	2,960	2,903	4,279	22,892	4,589	a6,026	1,983	1,167	1,179	6,176	6,643	14,978
19	3,442	a3,217	a3,002	20,404	4,768	8,506	1,426	1,230	2,310	16,047	a10,961	12,718
20	2,302	3,338	5,456	18,774	5,760	5,203	1,354	a 995	1,105	16,528	11,761	11,006
21	1,894	4,140	5,183	18,332	a 3,346	4,670	1,425	1,004	1,025	13,781	10,086	8,941
22	a3,254	3,292	4,636	17,671	5,512	3,780	1,402	865	1,590	a14,123	9,053	8,096
23	1,963	3,579	7,926	a15,246	5,097	3,483	a1,282	1,046	943	16,171	7,977	13,181
24	3,846	2,873	7,255	16,890	3,380	2,379	1,185	1,040	a 718	14,143	7,141	a18,220
25	3,383	1,974	5,835	15,574	4,831	a1,745	1,182	1,140	1,165	13,045	7,730	18,623
26	2,243	a2,257	a4,412	15,431	3,989	2,057	1,368	1,178	1,123	11,244	a 5,175	17,475
27	3,150	6,035	12,921	17,420	4,554	3,042	967	a 333	1,050	10,111	7,664	15,878
28	8,504	5,125	19,893	19,291	a 2,835	2,920	1,148	629	1,004	8,612	5,797	15,184
29	a6,338	.....	13,788	22,014	6,180	1,644	1,205	888	1,030	a 5,770	6,469	11,593
30	6,912	.....	13,446	a21,554	3,851	1,025	a 369	1,550	1,680	8,761	8,283	8,686
31	5,013	.....	11,457	.....	3,747	.....	1,048	1,577	.....	6,786	.....	a 8,615

a Sunday.

Monthly discharge of Hudson River at Mechanicville, N. Y., for 1911.

[Drainage area, 4,500 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	14,000	1,890	5,270	1.17	1.35
February	6,040	1,970	3,370	.749	.78
March	19,900	1,630	5,780	1.28	1.48
April	24,600	7,060	16,800	3.73	4.16
May	26,200	2,840	9,260	2.06	2.38
June	9,400	1,020	4,430	.985	1.10
July	2,390	369	1,360	.302	.35
August	2,040	368	1,180	.262	.30
September	6,510	718	2,000	.444	.50
October	16,500	489	7,240	1.61	1.86
November	12,100	3,920	7,560	1.68	1.87
December	18,600	3,500	10,000	2.22	2.54
The year	26,200	368	6,190	1.38	18.67

NOTE.—Computations by engineers of United States Geological Survey.

CEDAR RIVER NEAR INDIAN LAKE, N. Y.

Location.—At the steel highway bridge about 2 miles west of Indian Lake village, on the road leading to Blue Mountain Lake, about 12 miles by river above its confluence with the Hudson, 8 miles by river above the mouth of Rock River (tributary from the left) and 10 miles by river below Cedar River Flow (Wakely dam).

Records available.—July 15, 1911, to December 31, 1911. Published also in first annual report of State of New York Conservation Commission.

Drainage area.—85 square miles.[a]

Gage.—Standard chain and weight.

Channel.—Coarse gravel and small bowlders, fairly permanent. Low-water control is gravel rift about 200 feet below the bridge.

Storage.—The basin contains many lakes and swamps affording favorable sites for storage reservoirs which would be influential in regulating the discharge of Hudson River. Those that are important are Cedar Lakes and Cedar River Flow. Cedar River Flow is controlled by a lumberman's dam and is used principally during the logging season.

Accuracy.—Discharge rating curve not yet determined.

Cooperation.—Established and maintained in cooperation with the State of New York Conservation Commission.

Discharge measurements of Cedar River near Indian Lake, N. Y., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
July 15[b]	G. H. Canfield	2.52	31.0
Nov. 16[c]	Frank Weber	3.05	75.1

[a] Measured from topographic maps by engineers of Conservation Commission of New York.
[b] Discharge measurement made under upstream side of bridge by wading.
[c] Some ice near gage and shore.

Daily gage height, in feet, of Cedar River near Indian Lake, N. Y., for 1911.

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	2.52	2.45	2.60	3.58	4.00	16	2.50	2.45	3.10	2.80	3.05	4.92
2	.....	2.50	2.45	2.80	3.78	4.00	17	2.50	2.50	4.05	2.82	3.68	4.65
3	.....	2.50	2.58	2.75	3.95	3.45	18	2.71	2.50	3.12	2.80	3.90	4.52
4	.....	2.50	2.50	3.30	3.20	3.40	19	2.55	2.55	3.00	2.85	4.22	3.70
5	.....	2.45	2.50	3.40	3.22	3.45	20	2.50	2.55	2.80	3.00	4.06	3.50
6	.....	2.45	2.50	3.90	3.25	3.68	21	2.58	2.50	2.78	3.00	3.50	3.40
7	.....	2.45	2.85	4.00	3.50	3.75	22	2.55	2.50	2.78	3.00	3.45	3.30
8	.....	2.45	2.85	4.00	3.65	3.75	23	2.50	2.50	2.80	3.70	3.55	5.90
9	.....	2.45	3.25	3.90	.....	3.55	24	2.52	2.50	2.80	4.00	3.30	5.70
10	.....	2.45	3.45	2.85	.....	4.35	25	2.50	2.48	2.50	4.00	3.30	5.05
11	.....	2.50	3.48	2.85	.....	4.65	26	2.45	2.55	2.50	3.25	3.30	4.50
12	.....	2.50	3.32	2.90	.....	6.30	27	2.45	2.50	2.50	3.25	3.28	4.60
13	.....	2.50	3.25	2.90	.....	5.85	28	2.50	2.68	2.45	3.60	3.32	6.20
14	.....	2.48	2.92	2.82	.....	5.90	29	2.55	2.82	2.55	3.30	4.42	.....
15	2.52	2.45	2.88	2.80	.....	5.02	30	2.52	2.70	2.60	3.22	4.32	.....
							31	2.52	2.58	.....	3.30	.....	.....

NOTE.—Extent of backwater from ice not definitely known. The observer stated that the river was "frozen nearly all over" Nov. 20, "nearly all open" Dec. 7, that the ice was "all out of the river" Dec. 14, and that the river was "all frozen up" on Dec. 29.

INDIAN LAKE RESERVOIR AT INDIAN LAKE, N. Y.

Location.—At the masonry storage dam at the outlet of Indian Lake, about 7½ miles above the confluence of Indian River with the Hudson and about 23½ miles above the village of North Creek.

Records available.—July 22, 1900, to December 31, 1911. Data also in annual reports of the State engineer and surveyor, State Water Supply Commission, and State Conservation Commission.

Drainage area.—131 square miles, including about 9.3 square miles of water surface of Indian Lake at the elevation of the spillway of the dam.

Gage.—Staff; read once daily. November 17, 1911, a chain gage was installed on the crest of the dam to replace the staff gage. Datum of both gages the same and unchanged since the establishment of the station.

Discharge measurements.—The record of this station includes elevation of water surface in the reservoir, depth of water flowing over the spillway or flashboards, depth of opening, and the effective head on each of the 5-foot sluice gates. A meteorologic station has also been established at the dam by the United States Weather Bureau and records are kept of the rainfall, temperature, etc. The crest of the dam is 106.05 feet in the clear. To facilitate the calculation of discharge over the spillway, experiments were made at Cornell University in 1899 on a full-size model of the spillway section, 6.58 feet long, from which the coefficient of discharge has been determined. No computations of discharge have been made pending current meter measurements to rate discharge through gates. At present, record of reservoir level alone is obtainable. The elevation of the crest of the spillway above mean tide is 1,650 feet.

Artificial control.—The flow of the upper Hudson has been controlled to a considerable extent during the dry season by the use of Indian Lake Reservoir since its completion in 1899. Total storage provided, about 4,700,000,000 cubic feet, affording a discharge of nearly 600 second-feet for a period of 90 to 130 days each year.

Maximum and minimum gage heights.—Maximum gage height at Indian Lake Reservoir since the establishment of the station recorded April 27, 1908, 37.00 feet; minimum gage height, recorded March 9 to 18, 1907, and January 3 to 17, 1910, 2.00 feet.

Cooperation.—Station maintained in cooperation with State engineer and surveyor and State Conservation Commission.

Discharge measurement of Indian River near Indian Lake, N. Y., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
July 15	G. H. Canfield	*Feet.* [a] 7.00	*Sec.-ft.* 856

[a] Distance from reference point to water surface; reference point is top of eyebar of second span from right abutment downstream side of bridge. Measurement made at first highway bridge below dam; about 1½ miles downstream.
Gage at Indian Lake dam read 29.3 feet. One 5-foot sluice gate open 5 feet; the other open 2½ feet.

Daily gage height, in feet, of Indian Lake reservoir at Indian Lake, N. Y., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	11.20	11.45	7.95	6.70	22.10	29.25	32.35	24.40	14.75	13.65	18.05	22.35
2	11.15	11.35	7.85	7.00	23.75	29.30	32.35	24.00	14.80	13.55	18.10	22.50
3	11.20	11.20	7.70	7.25	24.75	29.35	32.35	23.80	14.85	13.50	18.20	22.60
4	11.40	11.10	7.60	7.40	25.15	29.40	32.35	23.40	14.85	13.60	18.30	22.70
5	11.46	10.95	7.45	7.55	25.50	29.40	32.35	23.00	14.85	13.90	18.40	22.80
6	11.55	10.85	7.25	7.85	25.85	29.60	32.30	22.70	14.80	14.05	18.45	22.85
7	11.70	10.70	7.05	8.15	26.10	29.85	32.05	22.20	14.70	14.20	18.70	22.90
8	11.80	10.60	6.85	8.55	26.35	30.10	31.80	21.90	14.60	14.40	18.90	23.00
9	11.90	10.45	6.65	8.90	26.65	30.15	31.60	21.50	14.60	14.50	19.10	23.10
10	12.00	10.35	6.40	9.25	26.85	30.25	31.25	21.10	14.75	14.60	19.30	23.20
11	12.10	10.20	6.20	9.55	27.05	30.40	30.90	20.90	14.85	14.70	19.50	23.40
12	12.15	10.10	6.05	9.80	27.15	30.65	30.35	20.50	14.85	14.80	19.70	23.70
13	12.25	9.95	5.90	10.05	27.30	31.10	30.00	20.10	14.85	14.90	19.90	24.40
14	12.35	9.85	5.70	10.45	27.40	31.40	29.60	19.90	14.90	14.90	20.00	25.00
15	12.49	9.70	5.65	11.10	27.55	31.70	29.25	19.45	15.05	14.95	20.10	25.45
16	12.50	9.60	5.45	11.60	27.65	31.80	28.90	19.00	15.15	15.00	20.25	25.70
17	12.55	9.45	5.30	12.15	27.70	31.95	28.60	18.80	15.20	15.05	20.35	25.90
18	12.45	9.35	5.15	12.60	27.85	32.10	28.30	18.40	15.25	15.20	20.85	26.20
19	12.35	9.20	4.95	13.00	27.95	32.25	28.10	18.00	15.30	15.55	20.90	26.40
20	12.20	9.10	4.80	13.40	28.15	32.30	27.80	17.80	15.35	15.90	21.00	26.50
21	12.10	8.96	4.65	13.90	28.30	32.35	27.70	17.40	15.20	16.10	21.10	26.60
22	11.90	8.85	4.45	14.35	28.40	32.40	27.55	17.00	15.10	16.35	21.15	26.70
23	11.85	8.70	4.30	14.75	28.45	32.40	27.25	16.80	14.90	16.60	21.20	27.30
24	11.70	8.60	4.15	15.15	28.70	32.45	27.00	16.55	14.75	16.85	21.25	27.70
25	11.60	8.45	3.95	15.75	28.85	32.50	26.90	16.10	14.60	17.10	21.45	28.00
26	11.45	8.35	3.79	16.50	28.90	32.50	26.60	15.90	14.40	17.30	21.60	28.30
27	11.35	8.20	4.00	17.45	29.00	32.35	26.15	15.65	14.25	17.40	21.80	28.60
28	11.35	8.10	5.15	18.70	29.10	32.35	25.80	15.40	14.10	17.55	21.85	28.75
29	11.40	.....	5.60	19.80	29.15	32.35	25.40	15.15	13.90	17.65	22.00	28.90
30	11.50	.....	6.00	21.10	29.15	32.35	25.00	14.90	13.75	17.80	22.20	29.00
31	11.60	.....	6.40	.....	29.20	.....	24.80	14.70	.....	17.95	.....	29.20

Gate openings, in feet, of Indian Lake reservoir at Indian Lake, N. Y., for 1911.

Date.	Sluice gate A open.	Sluice gate B open.	Date.	Sluice gate A open.	Sluice gate B open.	Date.	Sluice gate A open.	Sluice gate B open.
	Feet.	*Feet.*		*Feet.*	*Feet.*		*Feet.*	*Feet.*
Jan. 1 and 2	.....	5.0	July 6	.....	5.0	Sept. 8	.....	5.0
Jan. 18 and 19	.....	5.0	July 9	2.0	.....	Sept. 20	.....	5.0
Jan. 31	.....	5.0	July 26	2.5	.....	Sept. 30	.....	5.0
Feb. 1 and 2	.....	5.0	July 31	2.5	5.0	Oct. 1	.....	5.0
Mar. 1	.....	5.0	Aug. 1	2.0	5.0	Oct. 3	.....	5.0
Mar. 5	5.0	.....	Aug. 31	2.0	5.0			
Mar. 27	5.0	5.0	Sept. 5	.....	5.0			

SCHROON LAKE AT POTTERSVILLE, N. Y.

Location.—At the outlet of Schroon Lake, 1 mile from Pottersville post office, 9 miles upstream from the gaging station at Riverbank, N. Y.

Records available.—July 8, 1903 (station established), to December 5, 1908; July 1, 1909 (date of ice breaking not known), to December 4, 1909; April 17, 1910, to December 3, 1910; April 2, 1911, to December 31, 1911. Published also in annual reports of State Water Supply Commission and the State Conservation Commission.

Gage.—Staff fastened to steamboat wharf; read once daily. The gage datum was established at an elevation of 803.75 feet above sea level. Datum unchanged.

Winter records.—Observations are discontinued each year when the lake freezes and reestablished in the spring as soon as the ice breaks. See records available.

Cooperation.—Established and maintained by United States Geological Survey in cooperation with the State Water Supply Commission of New York.

Daily gage height, in feet, of Schroon Lake at Pottersville, N. Y., for 1911.

[Hannah Nichols, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	6.6	3.6	2.1	0.8	0.4	0.5	.....	2.7
2	1.5	6.65	3.5	1.9	.8	.4	.6	.....	2.7
3	1.6	6.7	3.4	1.9	.7	.4	.6	.....	2.7
4	1.7	6.6	3.4	1.8	.7	.4	.6	.....	2.7
5	1.7	6.45	3.4	1.8	.7	.4	.7	.....	2.7
6	1.7	6.1	3.4	1.8	.7	.4	.7	.....	2.7
7	1.9	5.9	3.4	1.7	.7	.4	.7	.....	2.7
8	1.1	5.7	3.4	1.7	.6	.4	.7	.....	2.7
9	2.0	5.5	3.4	1.6	.6	.5	.7	.....	2.7
10	2.6	5.2	3.4	1.5	.6	.4	.7	.....	2.7
11	3.0	4.9	3.4	1.3	.5	.4	.7	.....	2.9
12	3.8	4.8	3.5	1.3	.5	.5	(a)	[b] 2.6	2.9
13	4.85	4.75	3.5	1.1	.5	.5	.....	2.6	3.4
14	5.3	4.7	3.5	1.1	.5	.5	.....	2.7	3.6
15	5.8	4.5	3.6	1.1	.5	.6	.....	2.9	4.0
16	6.3	4.3	3.6	1.1	.5	.6	.....	3.0	4.5
17	6.5	4.2	3.6	1.1	.5	.6	.....	3.0	4.7
18	6.5	4.0	3.45	1.1	.5	.7	.....	3.0	4.8
19	6.4	4.0	3.2	1.1	.5	.5	.....	3.0	4.9
20	6.4	4.0	3.1	1.1	.5	.5	.....	3.0	4.9
21	6.3	4.0	3.0	1.0	.5	.4	.....	2.9	5.0
22	6.3	4.0	2.9	1.0	.5	.4	.....	2.9	5.1
23	6.2	4.0	2.8	1.0	.5	.4	.....	2.9	5.2
24	6.1	4.0	2.8	.9	.4	.4	.....	2.8	5.3
25	6.2	4.0	2.7	.9	.4	.4	.....	2.8	5.3
26	6.3	4.0	2.6	.9	.4	.4	.....	3.0	5.4
27	6.3	4.0	2.5	.8	.4	.35	.....	2.8	5.45
28	6.4	4.0	2.4	.8	.4	.35	.....	2.7	5.0
29	6.5	3.9	2.2	.8	.4	.3	.....	2.7	5.7
30	6.5	3.8	2.1	.8	.4	.3	.....	2.7	5.75
31	.....	3.7	.....	.8	.4	.....	.....	.....	5.8

[a] Gage removed, making repairs to dock.
[b] Gage installed by local parties, datum uncertain; indicates rate lake was filling to end of December.

SCHROON RIVER AT RIVERBANK, N. Y.

Location.—At the highway bridge 12 miles above the confluence of Schroon River with the Hudson, 9 miles below the mouth of Schroon Lake, about 3½ miles below the outlet of Brant Lake (coming in from the left), and 1 mile below Tumblehead Falls which extend upstream about a mile farther. The station is about 9 miles north of Warrensburg, where there are several dams used for power development.

Records available.—September 2, 1907, to December 31, 1911. Data also in annual reports of New York State Water Supply Commission, State engineer and surveyor, and State Conservation Commission.

Drainage area.—534 square miles.

Gage.—Chain; read once daily; datum unchanged.

Channel.—Gravel; smooth and permanent.

Discharge measurements.—Made from the bridge.

Artificial control.—Since 1907 the regimen of flow of Schroon River, from the low-water period to the high, has been somewhat affected by storage in Schroon Lake. In September, 1907, a timber crib dam was constructed at Starbuckville about 6 miles above the station. This dam affords a head of about 8 feet and ponds water to Schroon Lake.

Winterflow.—Affected by ice. Measurements made through the ice have developed a fairly good ice discharge curve.

Accuracy.—Open-water curve well developed. Gage heights are affected by log jams during May and June and for this period the daily discharge is obtained from a special rating curve.

Cooperation.—Established and maintained by United States Geological Survey in cooperation with the State Water Supply Commission of New York.

Discharge measurements of Schroon River at Riverbank, N. Y., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Jan. 20[a]	F. J. Shuttleworth	2.33	370
Feb. 26[b]	.....do	2.04	250
June 8[c]	C. S. De Golyer	3.00	698
Sept. 1[d]	Frank Weber	1.22	111
1[d]	G. H. Canfield	1.18	99.9
1[d]	.....do	1.16	94.1

[a] Measurement made under complete ice cover. Average thickness of ice 1.21 feet. Gage height to top of ice 2.40 feet.
[b] Measurement made under complete ice cover. Average thickness of ice 1.29 feet. Gage height to top of ice 2.20 feet.
[c] Logs in river caused backwater at gage.
[d] Measurement made by wading below the gage.

Daily gage height, in feet, of Schroon River at Riverbank, N. Y., for 1911.

[J. H. Roberts, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.85	2.25	2.1	2.5	5.2	2.6	1.7	1.3	1.2	1.4	2.35	2.65
2	1.85	2.3	2.05	2.35	5.2	2.4	1.65	1.3	1.2	1.4	2.4	2.6
3	2.0	2.3	2.0	2.6	5.5	2.35	1.6	1.25	1.2	1.4	2.4	2.6
4	2.05	2.4	1.95	2.55	5.4	2.3	2.15	1.25	1.12	1.45	2.4	2.65
5	2.1	2.25	1.9	2.6	5.0	2.9	2.15	1.25	1.15	1.45	2.35	2.55
6	2.1	2.35	1.95	2.85	4.8	3.2	2.15	1.2	1.15	1.5	2.4	2.5
7	2.05	2.4	1.85	3.1	4.4	3.2	2.1	1.25	1.12	1.6	2.4	2.5
8	2.1	2.3	1.9	3.2	4.2	3.3	1.7	1.25	1.12	1.8	2.3	2.5
9	2.4	2.15	1.95	3.2	4.2	3.2	1.4	1.25	1.3	1.8	2.32	2.5
10	2.3	2.2	1.95	3.6	4.1	3.1	1.6	1.25	1.55	1.75	2.5	2.45
11	2.3	2.2	1.8	3.8	3.9	2.0	1.45	1.25	1.45	1.8	2.45	2.5
12	2.3	2.2	1.65	4.1	3.8	3.2	1.35	1.15	1.5	1.75	2.45	2.5
13	2.25	2.4	1.75	4.3	3.7	3.2	1.3	1.2	1.6	1.7	2.55	2.7
14	2.3	2.35	1.8	4.4	3.4	3.2	1.3	1.15	1.48	1.7	2.65	3.1
15	2.3	2.3	1.95	5.1	3.4	3.2	1.35	1.15	1.5	1.6	2.7	3.2
16	2.4	2.2	2.0	5.4	3.4	3.2	1.2	1.15	1.5	1.6	2.8	3.3
17	2.4	2.25	2.05	5.5	3.3	3.3	1.25	1.15	1.48	1.65	2.7	3.5
18	2.35	2.25	1.9	5.4	3.3	2.9	1.3	1.2	1.48	1.8	2.8	3.6
19	2.3	2.15	1.75	5.4	3.4	3.0	1.4	1.2	1.5	2.2	2.75	3.6
20	2.3	2.25	1.9	5.3	3.4	2.75	1.4	1.15	1.45	2.2	2.8	3.6

Daily gage height, in feet, of Schroon River at Riverbank, N. Y., for 1911—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
21	2.25	2.25	1.95	5.3	2.85	2.65	1.4	1.15	1.45	2.2	2.8	3.5
22	2.2	2.3	1.9	5.2	2.9	2.65	1.35	1.15	1.48	2.2	2.7	3.6
23	2.3	2.25	1.9	5.1	2.95	2.55	1.3	1.1	1.45	2.42	2.75	3.8
24	2.45	2.3	1.95	5.0	3.2	2.25	1.45	1.1	1.35	2.35	2.7	3.9
25	2.4	2.25	2.0	5.0	3.6	2.3	1.35	1.05	1.38	2.4	2.7	4.1
26	2.4	2.35	1.8	5.0	2.95	2.35	1.3	1.05	1.45	2.4	2.65	4.1
27	2.4	2.2	2.15	5.0	3.4	2.4	1.35	1.05	1.45	2.4	2.65	4.1
28	2.45	2.15	2.35	5.2	2.3	2.3	1.35	1.1	1.4	2.35	2.65	4.1
29	2.15	.....	2.35	5.2	2.35	2.25	1.4	1.15	1.42	2.35	2.65	4.0
30	2.35	.....	2.45	5.2	2.3	2.2	1.25	1.1	1.4	2.4	2.65	4.0
31	2.3	.....	2.5	.....	3.2	.....	1.3	1.1	.....	2.4	.....	3.6

NOTE.—Relation of gage height to discharge doubtless affected by ice from Jan. 1 to about Mar. 18. Backwater from ice during December improbable. Gage readings were probably taken to the surface of the water. Backwater from log jams may have existed during the greater part of the open-water period. The plotting of the measurement made June 8 indicates that there was backwater during May and June.

Daily discharge, in second-feet, of Schroon River at Riverbank, N. Y., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	.....	.....	568	3,040	495	242	130	105	156	499	643
2	.....	.....	.....	499	3,040	395	226	130	105	156	522	618
3	.....	.....	.....	618	3,400	372	212	118	105	156	522	618
3	.....	.....	.....	593	3,280	350	411	118	86	170	522	643
5	.....	.....	.....	618	2,800	645	411	118	93	170	499	593
6	.....	.....	.....	749	2,560	815	411	105	93	184	522	568
7	.....	.....	.....	900	2,100	815	390	118	86	212	522	568
8	.....	.....	.....	966	1,890	875	242	118	86	276	485	568
9	.....	.....	.....	966	1,890	815	156	118	130	276	485	568
10	.....	.....	.....	1,290	1,780	755	212	118	198	259	568	545
11	.....	.....	.....	1,470	1,570	235	170	118	170	276	545	568
12	.....	.....	.....	1,780	1,470	815	143	93	184	259	545	568
13	.....	.....	.....	2,000	1,380	815	130	105	212	242	593	668
14	.....	.....	.....	2,100	935	815	130	93	178	242	643	900
15	.....	.....	.....	2,920	935	815	143	93	184	212	668	966
16	.....	.....	.....	3,280	935	815	105	93	184	212	721	1,040
17	.....	.....	.....	3,400	875	875	118	93	178	226	668	1,200
18	.....	.....	.....	3,280	875	645	130	105	178	276	721	1,290
19	.....	.....	259	3,280	935	700	156	105	184	432	694	1,290
20	.....	.....	312	3,160	935	694	156	93	170	432	721	1,290
21	.....	.....	331	3,160	620	643	156	93	170	432	721	1,200
22	.....	.....	312	3,040	645	643	143	93	178	432	668	1,290
23	.....	.....	312	2,920	673	593	130	81	170	531	694	1,470
24	.....	.....	331	2,800	815	454	170	81	143	499	668	1,570
25	.....	.....	350	2,800	1,060	476	143	70	151	522	668	1,780
26	.....	.....	276	2,800	673	499	130	70	170	522	643	1,780
27	.....	.....	411	2,800	935	522	143	70	170	522	643	1,780
28	.....	.....	499	3,040	350	476	143	81	156	499	643	1,780
29	.....	.....	499	3,040	372	454	156	93	162	499	643	1,670
30	.....	.....	545	3,040	350	432	118	81	156	522	643	1,670
31	.....	.....	568	.....	815	.....	130	81	.....	522	.....	1,290

NOTE.—Daily discharge determined from two discharge rating curves; the 1910 curve, applied Mar. 19 to May 13 and June 20 to Dec. 31, and a curve based on measurement made June 8, applied May 14 to June 19. It is not known to what extent other determinations of daily discharge may be in error, as a result of backwater from log jams not reported by the observer.

Monthly discharge of Schroon River at Riverbank, N. Y., for 1911.

[Drainage area, 534 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	.....	.....	357	0.669	0.77	D.
February	.....	.....	250	.468	.49	D.
March	568	.....	310	.581	.67	C.
April	3,400	499	2,130	3.99	4.45	A.
May	3,400	350	1,420	2.66	3.07	B.
June	875	235	625	1.17	1.30	B.
July	411	105	189	.354	.41	B.
August	130	70	99.2	.186	.21	B.
September	212	86	151	.283	.32	B.
October	531	156	333	.624	.72	B.
November	721	485	610	1.14	1.27	B.
December	1,780	545	1,060	1.99	2.29	B.
The year	3,400	70	628	1.18	15.97	

NOTE.—Discharge Jan. 1 to Mar. 18 estimated by means of records of discharge at other stations in the upper Hudson River basin, climatologic records, and two discharge measurements made during the period. Mean discharge Mar. 1 to 18 estimated 260 second-feet.

SACANDAGA RIVER AT WELLS, N. Y.

Location.—At the lower highway bridge in the village of Wells, 1 mile below the mouth of Elbow Creek and 2⅛ miles above the mouth of West Branch of Sacandaga River, both streams entering from the right.

Records available.—August 25, 1907, to September 30, 1911. Data also in annual reports of the State Water Supply Commission of New York, State engineer and surveyor of New York, and State of New York Conservation Commission. This station was discontinued October 1, 1911.

Drainage area.—263 square miles.

Gage.—Chain; read twice daily. Datum unchanged.

Channel.—Rough and permanent.

Discharge measurements.—Made from the bridge and by wading.

Artificial control.—There are no mills of any importance above the station. There are, however, several small storage reservoirs which hold back water for short periods to be used for logging. The release of this water has little effect on the daily gage readings. During the summer of 1911 a timber dam about 10 feet high was constructed about half a mile below the station on the site of an old dam formerly used for milling. The new dam, which furnishes power for a hardwood-veneer mill, was put in operation August 28, 1911, and caused backwater at the gaging station.

Winter flow.—Affected by ice.

Accuracy.—The low water and middle stage parts of the discharge rating curve are very well developed; but owing to the velocity of the water and the roughness of the channel, it is difficult to get accurate measurements at high stages, and determinations based on gage heights above 7 feet may be somewhat in error. Gage readings subsequent to August 28, 1911, of no value except as they show the effect of backwater from the new dam.

Cooperation.—Established and maintained by United States Geological Survey in cooperation with the State Water Supply Commission of New York.

Discharge measurements of Sacandaga River at Wells, N. Y., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Jan. 26[a]	F. J. Shuttleworth	4.95	194
Mar. 13[b]	C. S. De Golyer	4.37	166
Apr. 19[c]	E. S. Cullings	6.95	1,660
20[c]	do	7.00	1,740
25[c]	W. G. Hoyt	6.83	1,700
July 23[d]	C. S. De Golyer	3.96	47

[a] Discharge measurement made under partial ice cover.
[b] River practically free of ice above gage and for 300 feet below gage.
[c] Discharge measurement made by subsurface method using a coefficient of 0.72 to reduce surface velocities to mean velocity.
[d] Discharge measurement made by wading one-half mile upstream.

Daily gage height, in feet, of Sacandaga River at Wells, N. Y., for 1911.

[Frank Stanyon, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	6.8	5.2	4.7	5.3	7.8	5.45	4.40	3.82	6.4
2	6.7	5.2	4.7	5.2	8.4	5.35	4.36	3.82	7.2
3	7.2	5.25	4.6	5.1	7.6	5.3	4.32	3.86	7.0
4	7.2	5.2	4.6	5.1	7.5	5.3	4.32	3.78	8.1
5	7.2	5.3	4.5	5.1	7.6	5.3	4.28	3.75	9.9
6	7.2	5.3	4.5	5.3	7.2	5.4	4.22	3.74	10.2
7	7.0	5.2	4.48	6.15	6.4	5.75	4.15	3.71	10.2
8	6.7	5.2	4.48	6.6	7.2	5.9	4.08	3.70	10.3
9	6.6	5.2	4.45	6.3	7.0	5.6	4.00	3.69	10.5
10	6.5	5.1	4.42	6.3	6.4	5.35	4.00	3.68	10.2
11	6.25	5.1	4.4	6.3	6.4	5.2	3.92	3.64	10.1
12	6.1	5.1	4.42	6.5	6.4	5.65	3.90	3.60	10.1
13	5.85	5.1	4.45	6.7	6.4	6.6	3.95	3.60	10.1
14	5.9	5.0	4.65	7.1	6.4	6.9	3.90	3.62	10.1
15	5.8	5.0	4.45	7.6	6.4	6.4	3.85	3.62	10.2
16	5.7	5.05	4.55	7.1	6.4	5.95	3.88	3.60	10.4
17	5.6	5.0	4.6	6.8	6.4	5.65	3.88	3.64	10.2
18	5.45	5.0	4.6	6.8	6.35	5.5	3.88	3.60	10.1
19	5.3	4.9	4.6	6.9	6.3	5.25	3.92	3.60	10.0
20	5.2	4.9	4.5	7.0	6.4	5.1	3.90	3.62	10.0
21	5.2	4.9	4.5	7.0	6.3	4.9	3.92	3.60	10.0
22	5.15	4.8	4.6	6.7	6.45	4.9	3.90	3.62	10.0
23	5.1	4.8	4.6	6.5	6.4	4.8	3.80	3.64	10.0
24	5.0	4.75	4.6	6.35	6.4	4.8	3.98	3.60	10.0
25	5.0	4.75	4.6	6.9	6.35	4.7	4.00	3.59	10.0
26	4.98	4.7	4.65	7.5	6.4	4.6	3.94	3.58	10.0
27	4.98	4.7	4.85	7.9	6.35	4.5	3.88	3.59	10.1
28	5.1	4.68	4.5	8.1	6.0	4.5	3.88	3.95	10.1
29	5.25	.....	5.85	8.8	5.75	4.46	3.92	8.2	10.1
30	5.2	.....	5.6	8.0	5.7	4.42	3.94	6.2	10.1
31	5.2	.....	5.4	.....	5.48	.....	3.94	6.1	.....

NOTE.—Relation of gage height to discharge doubtless affected by ice from Jan. 1 to about Mar. 10. The gage readings were probably to water surface. The gage heights were probably more or less affected by backwater from log jams during April, May, and June. Beginning Aug. 29, the gage heights do not correctly indicate the discharge, as the station was flooded out by backwater from the newly constructed dam below.

Daily discharge, in second-feet, of Sacandaga River at Wells, N. Y., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.
1				530	2,540	620	161	33
2				475	2,330	560	149	33
3				425	1,700	530	138	38
4				425	1,620	530	138	29
5				425	1,700	530	127	27
6				530	1,410	590	110	26
7				1,100	905	815	93	24
8				1,460	1,410	920	77	23
9				1,220	1,280	715	60	22
10				1,220	1,300	560	60	22
11			161	1,220	1,300	475	46	19
12			167	1,380	1,300	748	43	17
13			176	1,540	1,300	1,460	52	17
14			242	1,890	1,390	1,710	43	18
15			176	2,350	1,300	1,300	37	18
16			208	1,890	1,300	955	41	17
17			225	1,620	1,300	748	41	19
18			225	1,620	1,260	650	41	17
19			225	1,710	1,220	502	46	17
20			192	1,800	1,300	425	43	18
21			192	1,800	1,220	337	46	17
22			225	1,540	1,340	337	43	18
23			225	1,380	1,300	297	31	19
24			225	1,260	1,300	297	57	17
25			225	1,710	1,260	260	60	16
26			242	2,260	1,300	225	50	16
27			317	2,640	1,260	192	41	16
28			192	2,840	990	192	41	52
29			885	3,560	815	180	46	(100)
30			715	2,740	780	167	50	(160)
31			590		648		50	(140)

NOTE.—Daily discharge determined from a well-defined discharge rating curve. The discharge is determined from the same rating curve used to compute revised estimates for this station published in Water-Supply Paper 281. Daily discharge Aug. 29, 30, and 31 estimated from the discharge at Hadley. Daily discharge May 2 to 9 reduced on account of the backwater from log jam.

Monthly discharge of Sacandaga River at Wells, N. Y., for 1911.

[Drainage area, 263 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January			240	0.913	1.05	D.
February			170	.646	.67	C.
March	885		248	.943	1.09	A.
April	3,560	425	1,550	5.89	6.57	A.
May	2,540	648	1,330	5.06	5.83	A.
June	1,710	167	594	2.26	2.52	B.
July	161	31	66.5	.253	.29	B.
August		16	33.1	.126	.15	B.

NOTE.—Discharge during January, February, and Mar. 1 to 10 has been estimated from the discharge at Hadley. Mean discharge, Mar. 1 to 10, 166 second-feet.

SACANDAGA RIVER NEAR HOPE, N. Y.

Location.—About 3½ miles above the post office at Hope, 4 miles below the village of Wells, 12 miles above Northville (the nearest railroad station), and 1½ miles below the junction of the East and West branches of the Sacandaga.

Records available.—September 15 to December 31, 1911.

Drainage area.—494 square miles.

Gage.—Staff in two sections: A sloping staff reading from 1.00 foot to 4.30 feet, on a slope of 2.5 to 1; a vertical staff (for high water records) attached to a rocky cliff in line with the sloping gage.

Channel.—Regular and permanent. Banks are fairly free from timber; high and rocky.

Discharge measurements.—The channel was cleared of bowlders and a cable with a span of 214 feet was erected for making discharge measurements.

Cooperation.—Established and maintained by United States Geological Survey in cooperation with the New York State Conservation Commission.

Discharge measurements of Sacandaga River near Hope, N. Y., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Sept. 19	C. S. De Golyer	2.04	243
26	do	1.87	197
30	do	2.33	385
30	do	2.34	378

Daily gage height, in feet, of Sacandaga River near Hope, N. Y., for 1911.

[Edgar Coulombe, observer.]

Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.
1	.....	2.28	3.22	3.51	16	2.43	2.44	3.52	4.12
2	.....	2.80	3.09	3.65	17	2.29	2.41	3.21	4.45
3	.....	2.70	3.00	3.34	18	2.16	3.28	4.28	4.11
4	.....	3.97	2.92	3.01	19	2.05	4.46	3.95	3.87
5	.....	3.44	2.83	2.90	20	1.98	4.08	3.74	3.46
6	.....	3.12	2.79	3.02	21	1.92	3.92	3.60	3.50
7	.....	3.14	3.24	2.88	22	1.96	3.81	3.43	3.48
8	.....	3.26	4.08	2.80	23	1.96	4.47	3.20	5.62
9	.....	3.18	3.85	2.85	24	1.92	4.23	3.31	4.92
10	.....	3.05	3.70	3.06	25	1.89	3.88	3.20	4.44
11	.....	2.93	3.69	3.44	26	1.84	3.64	3.12	4.26
12	.....	2.81	3.60	4.30	27	1.83	3.46	3.06	4.24
13	.....	2.72	4.05	5.25	28	1.83	3.35	2.96	4.02
14	.....	2.62	3.82	4.85	29	2.00	3.27	3.78	3.52
15	2.24	2.51	3.65	4.35	30	2.32	3.10	3.71	3.58
					31	.....	3.09	.....	.....

SACANDAGA RIVER AT HADLEY, N. Y.

CABLE STATION.

Location.—About half a mile west of the railroad station at Hadley, 1 mile above the confluence of Sacandaga River with the Hudson, and 4½ miles below the site of the proopsed storage dam at Conklingsville. No tributaries between this station and the mouth of the river. Location selected to avoid inaccuracies in the records caused by backwater from log jams.

Records available.—September 13, 1907, to December 31, 1910, upper bridge station; September 24, 1909, to midsummer 1911, lower bridge station; January 1 to December 31, 1911, cable station. The cable station replaces the upper and lower bridge stations. Data also in annual reports of the New York State Water Supply Commission, State Conservation Commission, and State engineer and surveyor.

Drainage area.—1,050 square miles.

Gage.—Recording hydrograph (Barrett-Lawrence type) 30 feet downstream from the cable, in a concrete well 3 feet square, inside dimensions. The bottom of the well is about 2 feet below low water and 12 feet below ground surface. It is connected with the river by a 4-inch cast-iron water pipe 48 feet long, its intake end pointing downstream and protected by a fine wire screen. Inside the well and securely bolted to the side is a staff gage, its zero at elevation 573.36 and referred to a United States Geological Survey aluminum tablet set in the foundation wall

of the Union Bag & Paper Co.'s mill at Hadley. The top of the wall is a concrete shelter 6 feet high and 3 feet square, inside dimensions, for protecting the recording gage. The staff gage is used only as a reference gage.

Channel.—Very rough but permanent. The channel at the cable was cleared of bowlders as far as feasible, so that fairly accurate discharge measurements can be made at medium and high stages. Low-water measurements are made at a section about three-fourths of a mile above the cable, where the bottom is smooth and gravelly. Measurements at this point are made from a boat or by wading.

Winter flow.—The water in the well and in the intake pipe never freezes over because its level is below the frost line. The relation of gage height to discharge is, however, considerably affected by ice.

Accuracy.—The discharge rating curve which has been developed for this station is fairly well defined.

Cooperation.—Station maintained in cooperation with the New York State Conservation Commission.

LOWER BRIDGE.

Location.—On the highway bridge a few hundred feet above the mouth of Sacandaga River.

Records available.—September 24, 1909, to midsummer, 1911, when the station was discontinued. Data also in annual reports of the New York State Water Supply Commission and the State Conservation Commission.

Gage.—Chain; read twice daily; datum unchanged.

Channel.—Rough but permanent.

Discharge measurements.—Made from the bridge.

Winter flow.—Relation of gage height to discharge affected by ice.

Accuracy.—Gage heights at times affected by backwater from Hudson River. Conditions fairly good for making discharge measurements. See reports for 1910 for further information regarding this station. Gage heights after about July 7 are valueless, as the relation of gage height to discharge was disturbed by construction work at the bridge.

Cooperation.—Established in cooperation with State Water Supply Commission of New York. Gage heights furnished through the courtesy of the Union Bag & Paper Co.

Discharge measurements of Sacandaga River at cable station at Hadley, N. Y., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Jan. 18[a]	F. J. Shuttleworth	6.45	886
Apr. 8	W. G. Hoyt	5.87	4,300
15	C. C. Covert	7.13	7,510
16	Cullings & Clark	7.55	8,890
17	Cullings	7.61	9,490
20	W. G. Hoyt	6.84	6,820
June 6	C. S. De Golyer	3.75	1,020
10	G. H. Canfield	4.60	2,000
July 11[b]	do	2.82	330
11[b]	do	2.82	315
12[b]	do	2.80	302
12[b]	do	2.79	311
29	do	2.69	256
Sept. 3[b]	do	2.97	389
28[c]	W. G. Hoyt	2.94	323
28[c]	G. H. Canfield	2.94	321
28[c]	W. G. Hoyt	2.94	350
29	do	2.95	356
Oct. 10[c]	F. Weber	4.57	1,800
11	G. H. Canfield	4.43	1,640
12[c]	F. Weber	4.29	1,450

[a] Measurement made at cable section; 140 feet ice cover, 92 feet open water.
[b] Measurements made by wading at cable section.
[c] Measurements made from boat ¼ mile above cable.

Daily gage height, in feet, of Sacandaga River at cable station at Hadley, N. Y., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.9	5.3	4.5	5.6	7.2	3.9	3.3	2.68	3.1	3.45	4.7	5.3
2	5.0	5.1	4.25	5.5	7.2	4.2	3.2	2.63	2.94	3.65	4.8	5.1
3	5.4	5.4	4.3	5.2	7.2	4.05	3.2	2.57	3.0	4.05	4.7	4.9
4	6.6	4.9	4.15	5.1	7.1	3.85	3.15	2.52	3.1	4.15	4.6	4.6
5	7.3	4.7	4.15	4.9	6.8	3.7	3.05	2.49	3.1	4.5	4.45	4.15
6	7.2	5.3	4.0	5.1	6.4	3.9	3.0	2.49	3.05	4.7	4.3	4.15
7	7.2	5.4	4.1	5.7	6.1	4.35	2.96	2.46	3.75	4.6	4.5	4.3
8	7.0	5.1	4.0	6.0	5.6	4.8	2.92	2.51	3.9	4.7	5.1	4.2
9	6.5	4.6	3.95	6.4	5.4	4.9	2.88	2.6	3.95	4.8	5.5	4.15
10	6.4	4.7	3.8	6.8	5.0	4.6	2.87	2.56	4.35	4.7	5.5	4.2
11	6.1	4.35	3.85	6.8	4.8	4.35	2.82	2.58	4.45	4.45	5.4	4.45
12	5.7	4.5	3.8	6.7	4.7	4.2	2.8	2.67	4.15	4.3	5.3	5.0
13	5.6	4.2	3.8	6.6	4.6	4.6	2.76	2.52	3.95	4.1	5.5	5.8
14	5.5	4.2	3.95	6.8	4.5	5.4	2.72	2.48	3.8	3.95	5.6	6.2
15	5.1	4.35	4.1	7.1	4.15	5.5	2.7	2.44	3.55	3.85	5.5	6.3
16	5.4	4.45	4.4	7.5	4.4	5.3	2.68	2.4	3.45	3.7	5.3	6.2
17	6.0	4.2	4.6	7.6	4.3	5.0	2.71	2.41	3.45	3.65	5.0	6.3
18	6.4	4.0	4.35	7.4	4.3	4.7	2.71	2.4	3.4	4.3	5.0	6.3
19	6.6	4.2	4.35	7.0	4.3	4.35	2.72	2.4	3.25	6.2	5.6	6.2
20	5.0	5.0	4.2	6.8	4.45	4.1	2.74	2.41	3.15	6.4	5.7	5.8
21	5.5	4.9	4.15	6.8	4.3	3.9	2.71	2.41	3.05	6.5	5.6	5.4
22	5.1	4.6	4.1	6.7	4.0	3.7	2.67	2.4	3.05	6.4	5.4	5.2
23	5.1	4.6	4.25	6.6	4.3	3.6	2.62	2.39	3.0	6.3	5.0	5.9
24	4.7	4.3	4.5	6.5	4.35	3.5	2.6	2.38	3.0	6.4	4.8	6.6
25	4.6	4.25	4.5	6.4	4.5	3.4	2.61	2.39	3.0	6.4	4.8	6.9
26	4.4	4.2	4.45	6.5	4.5	3.4	2.67	2.4	3.0	6.1	4.6	6.8
27	4.3	4.2	5.1	6.7	4.45	3.35	2.7	2.4	2.97	5.8	4.6	6.6
28	4.6	4.6	6.1	6.9	4.3	3.6	2.68	2.6	2.95	5.3	4.5	6.4
29	5.2	.....	6.2	7.1	3.95	3.6	2.69	3.1	2.98	5.0	4.8	5.9
30	.....	.....	6.2	7.2	4.15	3.45	2.69	3.6	3.15	4.8	5.3	5.5
31	5.6	.....	5.8	.....	3.95	.....	2.69	3.3	.....	4.6	.....	5.4

NOTE.—Daily gage heights for 1911 have been determined by a continuous recording automatic gage. The relation of gage height to discharge was probably affected by ice from Jan. 1 to about Mar. 30.

Daily discharge, in second-feet, of Sacandaga River at cable station at Hadley, N. Y., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov0	Dec.
1	.....	3,680	7,880	1,060	557	232	435	662	2,050	3,080
2	.....	3,470	7,880	1,380	494	212	351	821	2,210	2,710
3	.....	2,890	7,880	1,220	494	189	381	1,220	2,050	2,370
4	.....	2,710	7,580	1,010	464	171	435	1,330	1,900	1,900
5	.....	2,370	6,690	864	408	161	435	1,760	1,700	1,330
6	.....	2,710	5,590	1,060	381	161	408	2,050	1,500	1,330
7	.....	3,900	4,840	1,570	361	151	910	1,900	1,760	1,500
8	.....	4,600	3,680	2,210	341	168	1,060	2,050	2,710	1,380
9	.....	5,590	3,270	2,370	322	200	1,110	2,210	3,470	1,330
10	700	6,690	2,540	1,900	317	186	1,570	2,050	3,470	1,380
11	650	6,690	2,210	1,570	293	193	1,700	1,700	3,270	1,700
12	650	6,400	2,050	1,380	284	228	1,330	1,500	3,080	2,540
13	650	6,120	1,900	1,900	266	171	1,110	1,270	3,470	4,130
14	750	6,690	1,760	3,270	249	157	956	1,110	3,680	5,080
15	750	7,580	1,330	3,470	240	144	738	1,010	3,470	5,330
16	800	8,780	1,630	3,080	232	131	662	864	3,080	5,080
17	850	9,080	1,500	2,540	244	134	662	821	2,540	5,330
18	878	8,480	1,500	2,050	244	131	625	1,500	2,540	5,330
19	850	7,280	1,500	1,570	249	131	526	5,080	3,680	5,080
20	900	6,690	1,700	1,270	258	134	464	5,590	3,900	4,130
21	1,000	6,690	1,500	1,060	244	134	408	5,850	3,680	3,270
22	930	6,400	1,160	864	228	131	408	5,590	3,270	2,890
23	1,000	6,120	1,500	778	208	128	381	5,330	2,540	4,360
24	1,080	5,850	1,570	698	200	125	381	5,590	2,210	6,120
25	1,080	5,590	1,760	625	204	128	381	5,590	2,210	6,980
26	1,360	5,850	1,760	625	228	131	381	4,840	1,900	6,690
27	1,650	6,400	1,700	591	240	131	366	4,130	1,900	6,120
28	3,310	6,980	1,500	778	232	200	356	3,080	1,760	5,590
29	3,830	7,580	1,110	778	236	435	371	2,540	2,210	4,360
30	4,210	7,880	1,330	662	236	778	464	2,210	3,080	3,470
31	4,130	.....	1,110	.....	236	557	.....	1,900	.....	3,270

NOTE.—Daily discharge determined from a fairly well-defined discharge rating curve. The discharg Mar. 10 to 14, 18, and 21 to 30 taken from the record at the lower station, where there was probably no back water from ice. Discharge Mar. 15–17, 19, and 20 estimated on account of ice.

Monthly discharge of Sacandaga River at cable station at Hadley, N. Y., for 1911.

[Drainage area 1,050 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January			1,030	0.981	1.13	C.
February			735	.700	.73	B.
March			1,250	1.19	1.37	B.
April	9,080	2,370	5,920	5.64	6.29	A.
May	8,030	1,110	2,930	2.79	3.22	A.
June	3,510	591	1,470	1.40	1.56	B.
July	598	200	296	.282	.33	B.
August	855	125	202	.192	.22	B.
September	1,790	351	659	.628	.70	B.
October	5,850	662	2,680	2.55	2.94	A.
November	3,970	1,500	2,680	2.55	2.84	A.
December	7,010	1,330	3,710	3.54	4.08	A.
The year	9,080		1,970	1.88	25.41	

NOTE.—Discharge Jan. 1 to Mar. 9 estimated by means of 4 discharge measurements made at the cable and lower bridge stations with ice present, the discharge at Corinth, and climatologic records. Mean discharge Mar. 1 to 9, 733 second-feet.

Discharge measurements of Sacandaga River at lower bridge at Hadley, N. Y., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.ft.*
Jan. 31[a]	C. C. Covert	7.82	761
Feb. 10[b]	do	7.48	736
27[c]	do	5.96	773
Mar. 18[d]	C. S. Debolyer	5.93	878

[a] Ice below bridge causing backwater.
[b] Ice below bridge causing back water and some slush ice for about 40 feet along left-hand abutment.
[c] 55 feet of ice out from left-hand abutment, rest of channel open; thickness of ice 1.0 feet.
[d] River free from ice at bridge; about 200 feet below bridge it extends nearly across the river.

Daily gage height, in feet, of Sacandaga River at lower bridge at Hadley, N. Y., for 1911.

[Union Bag & Paper Co.'s mills.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.
1		8.0	6.3	8.2	10.8	6.0	5.0	4.5
2		7.9	6.0	7.7	11.0	6.4		4.45
3		8.6	6.0	7.5	11.1	6.2	4.95	4.4
4		8.0	5.9		10.8			4.35
5	10.1			7.4	10.2	5.6	4.75	4.3
6	9.8	8.2		7.5	9.6	5.8	4.7	
7	9.2	8.2	5.6	8.2		6.4	4.6	4.25
8		8.0	5.7	8.7	8.4	7.3	4.6	4.25
9	8.2	7.2	5.6		8.1	7.6		
10	8.1	7.4	5.4	8.7	7.7	7.1	4.6	
11	7.6	6.9	5.3	9.9	7.4		4.5	
12	7.4			9.8	7.2	6.4	4.5	
13	.4	6.4	5.3	10.0	7.2	6.9	4.5	
14	7.3	6.4	5.5	10.2		7.8	4.45	4.25
15		6.6		10.6	6.4	8.0	4.4	4.15
16	7.9	6.9			6.8	7.8		4.15
17	8.6	6.8		11.2	6.6	7.6	4.4	4.15
18	9.4	6.1		11.2	6.6		4.35	4.15
19	9.7			10.7	6.2	6.7	4.4	4.15
20	9.5	6.9		10.4	6.8	6.4	4.5	

Daily gage height, in feet, of Sacandaga River at lower bridge at Hadley, N. Y., for 1911—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July	Aug.
21	8.3	7.2	5.9	10.1	.....	6.0	4.5	4.1
22	.....	6.6	5.8	10.1	6.1	5.7	4.45	4.1
23	7.7	6.3	5.9	.....	6.6	5.5	.....	4.0
24	6.8	6.1	6.0	10.0	6.65	5.3	4.4	.....
25	6.6	5.8	6.0	9.8	6.9	.....	4.4	4.0
26	6.2	.....	.....	10.1	6.9	5.3	4.5	4.1
27	6.2	5.9	6.6	10.2	6.6	5.1	4.5	.....
28	6.1	6.3	7.8	10.6	.....	5.5	4.45	4.2
29	.....	.....	8.1	10.7	6.0	5.6	4.45	4.9
30	6.5	.....	8.3	.....	.....	5.4	.....	5.9
31	7.8	.....	8.5	.....	6.0	.....	4.5	5.4

NOTE.—Relation of gage height to discharge probably affected by backwater from ice and log jams from about Jan. 1 to about Mar. 9, and by backwater from the Hudson from about Apr. 11 to about May 14; known to be affected July 8 to Aug. 31 by construction work on the bridge which necessitated the movement of the chain gage.

Daily discharge, in second-feet, of Sacandaga River at lower bridge at Hadley, N. Y., for 1911.

[Union Bag & Paper Co.'s mills.]

Day.	Mar.	Apr.	May.	June.	July.	Day.	Mar.	Apr.	May.	June.	July.
1	.....	4,020	.....	1,080	520	16	810	.....	1,880	3,310	.....
2	.....	3,150	.....	1,440	510	17	840	.....	1,650	2,990	.....
3	.....	2,840	.....	1,250	500	18	880	.....	1,650	2,380	.....
4	.....	2,760	.....	1,030	464	19	920	.....	1,250	1,760	.....
5	.....	2,690	.....	805	428	20	960	.....	1,880	1,440	.....
6	.....	2,840	.....	930	410	21	1,000	.....	1,520	1,080	.....
7	.....	4,020	.....	1,440	380	22	930	.....	1,160	865	.....
8	.....	5,030	.....	2,540	.....	23	1,000	.....	1,650	750	.....
9	.....	5,030	.....	2,990	.....	24	1,080	.....	1,700	650	.....
10	700	5,030	.....	2,260	.....	25	1,080	.....	2,000	650	.....
11	650	.....	.....	1,850	.....	26	1,360	.....	2,000	650	.....
12	650	.....	.....	1,440	.....	27	1,650	.....	1,650	560	.....
13	650	.....	.....	2,000	.....	28	3,310	.....	1,360	750	.....
14	750	.....	.....	3,310	.....	29	3,830	.....	1,080	805	.....
15	780	.....	1,440	3,650	.....	30	4,210	.....	1,080	700	.....
						31	4,610	.....	1,080	.....	.....

NOTE.—Daily discharge determined from a discharge rating curve not very well defined. Discharge for days omitted from the record during periods Jan. 1 to Mar. 9, and Apr. 11 to May 14 affected by backwater from ice, log jams, or high stages in the Hudson. The record omitted July 8 to Aug. 31 was affected by change in the gage necessitated by construction work at the bridge. Mean discharge for June, when there was probably no backwater was 1,580 second-feet. Discharge interpolated for days on which the gage was not read.

WEST BRANCH OF SACANDAGA RIVER AT BLACKBRIDGE, NEAR WELLS, N. Y.

Location.—On the highway bridge known as Blackbridge, about 3 miles west of Wells and 2 miles above the junction of the East and West branches of Sacandaga River. Replaces station formerly located at Whitehouse.

Records available.—March 14 to December 31, 1911.

Drainage area.—211 square miles.

Gage.—Chain, attached to upstream side of the highway bridge; read twice daily; datum unchanged.

Channel.—Rocky and permanent; two channels at extreme high water.

Discharge measurements.—Made from the bridge and by wading. Section beneath the bridge was cleared of bowlders in September, 1911.

Artificial control.—Gage heights slightly affected by storage dams used for logging in the spring.

Winter flow.—Probably little affected by ice. Stream open during greater part of the winter.

Cooperation.—Established in cooperation with the State of New York Conservation Commission.

Discharge measurements of West Branch of Sacandaga River at Blackbridge, near Wells, N. Y., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
July 23	C. S. De Golyer	3.10	75
Sept. 29	do	[a] 3.65	185
29	do	[a] 3.65	176
30	do	[a] 3.80	218

[a] Gage heights uncertain, as gage was slightly disturbed and had not been reset by level.

NOTE.—Measurements made by wading under upstream side of bridge.

Daily gage height, in feet, of West Branch of Sacandaga River at Blackbridge, near Wells, N. Y., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	4.85	6.62	4.40	3.72	2.94	3.53	3.70	4.35	4.76
2	.....	4.68	7.51	4.08	3.70	2.90	3.26	3.80	4.45	4.66
3	.....	4.56	6.26	4.04	3.66	2.85	3.47	3.90	4.40	4.45
4	.....	4.58	6.19	3.80	3.58	2.89	3.32	4.40	4.25	4.35
5	.....	4.62	6.14	4.32	3.55	2.84	3.20	4.65	4.35	4.35
6	.....	4.84	5.57	4.06	3.51	3.75	3.88	4.50	4.15	4.25
7	.....	5.68	5.06	4.52	3.50	3.42	3.96	4.30	4.55	4.10
8	.....	5.67	5.25	4.34	3.51	3.06	4.15	3.11	5.20	4.10
9	.....	5.33	4.47	4.06	3.48	3.31	4.31	4.51	5.15	4.20
10	.....	5.23	1.55	4.10	3.44	3.16	4.32	4.55	5.15	4.51
11	.....	5.12	4.15	3.99	3.40	2.99	4.24	4.45	5.05	4.75
12	.....	5.28	4.20	3.86	3.38	2.96	4.02	4.25	5.10	5.80
13	.....	5.52	4.55	4.70	3.36	3.83	3.92	4.10	5.25	6.45
14	3.84	5.98	4.85	5.46	3.32	3.76	3.84	3.15	5.15	5.55
15	4.92	6.10	4.40	4.86	3.27	3.64	3.91	4.46	6.50	5.80
16	5.30	6.14	4.40	4.86	3.42	3.48	3.78	3.80	4.55	5.56
17	5.40	6.04	5.65	4.54	3.46	3.35	3.66	3.75	6.20	5.60
18	4.67	5.90	4.65	4.42	3.40	2.95	3.50	4.50	5.10	5.65
19	4.58	5.90	4.80	4.24	3.23	2.86	(a)	4.25	5.40	5.25
20	4.46	5.85	5.20	4.03	3.18	2.99	(a)	5.20	5.15	5.20
21	4.14	6.00	4.76	3.84	3.08	2.94	(a)	5.20	5.05	4.95
22	3.97	5.90	4.80	3.82	2.95	2.88	(a)	1.35	4.55	4.76
23	4.24	5.85	5.20	3.74	3.08	2.82	3.14	5.70	4.35	6.80
24	4.13	5.82	5.02	3.64	3.26	2.78	3.08	5.40	4.70	5.60
25	4.08	5.74	5.05	3.62	3.40	2.74	3.10	4.35	4.55	5.45
26	3.96	6.41	5.00	3.57	3.22	2.82	3.10	5.10	4.25	5.51
27	4.76	6.68	4.28	3.61	3.14	2.90	3.10	5.05	4.25	5.65
28	5.74	7.45	4.12	3.73	3.08	3.14	3.10	4.65	4.25	4.65
29	5.42	7.40	4.12	3.60	3.02	4.15	3.58	4.50	4.65	4.95
30	4.90	7.10	4.08	3.68	2.96	3.88	3.80	4.30	4.81	4.76
31	5.04	.....	4.15	.....	2.98	3.66	.....	3.90	.....	4.96

[a] Record missing, gage injured by blasting in river channel; readings for remainder of year may be slightly in error.

HOOSIC RIVER NEAR EAGLE BRIDGE, N. Y.

Location.—1½ miles above the village of Eagle Bridge and ½ mile below the mouth of Walloomsac River coming in from the right. Owlkill Creek enters from the right at Eagle Bridge. Replaces station formerly maintained at Buskirk. The Buskirk station was abandoned because the relation between gage height and discharge was affected by backwater caused by the construction of a dam at Johnsonville.

Records available.—August 13, 1910, to December 31, 1911. For the station formerly maintained at Buskirk, 4 miles below, records are available from September 25, 1903, to December 31, 1908. Data published also in annual reports of New York State engineer and surveyor.

Drainage area.—512 square miles.

Gage.—Standard chain, supported by cantilever arm on a tree on the left bank about 400 feet above the residence of James Russell. Datum unchanged.

Channel.—Bed of river composed of gravel; liable to shift. Control point about 400 feet below the gage.

Discharge measurements.—At low stages made by wading; at high stages made from the highway bridge in the village of Eagle Bridge, 1½ miles below. To determine the flow of the river past the gage by measurements made at the highway bridge it is necessary to measure the flow of Owlkill Creek, which enters just above the bridge, and subtract the amount from the measured flow at the bridge. A cable is to be erected at this station.

Artificial control.—The dam of Walter A. Wood & Co. is located at Hoosic Falls, about 2 miles above the gage. Walloomsac River is also partly controlled, and the effect of the operation of the mills is observable at the gage. On this account the gage heights should be used with caution.

Accuracy.—Discharge rating not sufficiently developed to warrant the publication of determinations of discharge.

Cooperation.—Established and maintained by the United States Geological Survey in cooperation with the State engineer and surveyor of New York.

Discharge measurements of Hoosic River near Eagle Bridge, N. Y., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Jan. 30[a]	F. J. Shutteworth	9.26	[b] 1,460
Mar. 15	Hoyt, Cullings, Preston	8.82	[b] 852
June 16	W. G. Hoyt	8.54	[b] 972
Aug. 23[c]	F. Weber	7.20	197
23[c]	do	6.95	120
Sept. 26[c]	G. H. Canfield	7.59	348
26[c]	W. G. Hoyt	7.38	263

[a] River free of ice.
[b] Discharge measurements made at highway bridge, 2 miles below gage; discharge corrected for flow in Owlkill Creek.
[c] Discharge measurements made by wading near gage.

Daily gage height, in feet, of Hoosic River near Eagle Bridge, N. Y., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	9.30	8.35	8.15	9.22	9.30	7.60	7.13	7.18	7.35	8.08	8.98	9.10
2	10.90	8.15	7.75	8.65	10.55	7.55	7.25	7.10	7.35	8.52	8.65	8.88
3	12.45	7.95	7.80	8.60	9.65	7.55	7.20	7.02	7.13	8.40	8.55	8.62
4	11.15	8.30	7.75	8.55	9.15	7.20	7.10	7.05	7.20	8.48	8.42	8.62
5	9.45	8.40	7.70	9.35	8.85	7.55	7.08	6.77	7.10	9.48	8.28	8.30
6	9.15	7.95	7.75	11.10	8.70	7.65	7 05	6.80	7.40	8.70	8.40	8.35
7	9.20	7.95	7.70	12.20	8.40	7.85	7.12	7.15	7.87	9.05	8.68	8.35
8	8.78	8.10	7.65	10.80	8.40	7.80	7.15	7.18	8.08	8.88	8.75	8.35
9	9.30	7.95	7.70	10.45	8.50	7.60	6.85	7.15	7.53	8.68	8.48	8.35
10	8.55	8.00	7.65	10.00	8.15	7.40	7.08	6.90	9.78	8.50	8.45	8.25
11	8.40	7.90	7.70	9.65	8.05	7.25	7.25	7.08	8.57	8.32	8.38	8.32
12	.....	7.95	7.60	9.60	8.00	7.72	6.90	6.77	8.28	8.20	8.20	8.50
13	.....	7.90	7.70	9.65	8.10	9.72	7.08	6.78	7.90	8.18	9.48	8.55
14	.....	.....	8.00	10.38	8.05	9.70	6.98	6.65	7.78	7.92	8.80	8.40
15	.....	.....	10.40	12.20	8.15	8.80	6.70	6.77	7.67	7.85	8.75	8.40

Daily gage height, in feet, of Hoosic River near Eagle Bridge, N. Y., for 1911—Contd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16	8.00	.....	8.80	11.05	7.95	8.50	6.72	6.90	7.97	7.95	8.75	8.90
17	7.85	.....	8.15	10.15	7.85	8.35	7.15	7.05	7.95	7.90	8.52	9.30
18	7.95	8.75	8.15	9.65	7.80	8.00	7.12	7.02	7.82	7.95	9.48	9.28
19	8.00	8.60	8.00	9.60	7.90	7.95	7.03	7.18	7.83	12.45	9.92	8.95
20	8.00	8.20	8.20	9.45	8.55	7.98	7.08	6.95	7.68	10.85	9.32	8.60
21	8.05	8.25	8.00	9.30	8.05	7.73	6.95	7.00	7.67	9.90	9.22	8.50
22	8.00	7.78	8.30	9.40	7.90	7.75	7.00	6.75	7.50	10.88	8.98	8.58
23	7.95	7.70	9.60	9.25	7.80	7.60	6.80	6.80	7.63	11.62	8.72	11.60
24	7.95	7.75	8.50	9.05	7.65	7.55	7.08	6.95	7.62	10.58	8.92	10.40
25	7.80	7.75	8.15	9.30	7.70	7.28	7.58	6.73	7.63	9.75	9.10	9.75
26	7.80	8.00	8.40	9.60	7.75	7.57	7.20	6.85	7.47	9.45	8.60	9.55
27	8.10	8.80	11.45	9.65	7.55	7.58	7.12	7.05	7.52	9.20	8.75	9.75
28	12.65	8.50	13.00	9.80	7.52	7.62	7.00	7.30	7.55	8.98	8.72	9.50
29	9.25	.....	10.00	9.65	7.50	7.52	7.30	8.97	7.62	8.78	10.18	8.85
30	9.22	.....	11.52	9.45	7.25	7.48	7.12	8.30	8.10	8.68	9.42	8.70
31	8.05	.....	9.85	.....	7.40	.....	7.20	7.75	.....	8.60	.....	8.55

NOTE.—Information regarding ice at this station is incomplete. The observer states that the ice passed out of the river during the night of Jan. 2 and on Mar. 18. Relation of gage height to discharge probably more or less affected by backwater from ice during the greater part of January, February, and March.

SCHOHARIE CREEK AT PRATTSVILLE, N. Y.

Location.—At the single-span steel highway bridge at Prattsville.

Records available.—November 7, 1902, to December 31, 1911. Data also in reports of State engineer and surveyor, State of New York.

Drainage area.—240 square miles.

Gage.—Standard Board of Water Supply chain gage attached to the floor of the bridge on the upstream side near the left bank; established May 7, 1907, to replace the old gage, which was dilapidated and unwieldy. The old datum, 1,130.03 feet (United States Geological Survey bench mark), was preserved. Gage was read morning and evening by Miss Edna M. Snyder, of Prattsville, N. Y., until September 30, 1910, and by her brother, Charles Snyder, after that date.

Channel.—All the water passes between the abutments of the bridge except at the very highest stages.

Discharge measurements.—Made from the bridge at high stages; at low stages measurements may be made by wading at a point about 500 feet below the bridge.

Winter flow.—The winter record is obtained from a temporary gage established at a point about 500 feet below the bridge, where there is a sufficient velocity to prevent the channel from freezing over.

Artificial control.—Flow probably practically unaffected by fluctuations of stage from storage above Prattsville.

Cooperation.—Station assumed May 7, 1907, by the Board of Water Supply of the City of New York, by which discharge tables were furnished.

Daily discharge, in second-feet, of Schoharie Creek at Prattsville, N. Y., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	530	231	452	512	721	98	98	21	106	59	285	335
2	1,600	182	476	440	1,170	90	98	25	98	59	173	325
3	3,250	158	416	416	621	80	98	24	106	57	85	285
4	1,725	206	452	551	512	73	85	21	85	57	35	300
5	990	170	392	3,925	488	90	80	18	98	73	15	275
6	753	152	325	2,600	428	153	80	18	122	112	61	275
7	713	142	325	2,138	368	205	73	20	335	205	205	265
8	649	205	275	2,175	300	1,260	57	21	340	240	374	235
9	551	170	285	2,200	285	476	40	25	368	217	265	245
10	452	135	285	1,888	250	300	25	25	340	205	255	235
11	551	114	380	1,107	217	285	29	24	315	201	235	245
12	621	128	368	801	225	1,680	25	25	275	177	250	245
13	537	128	410	1,197	235	2,262	21	18	177	185	670	225
14	745	100	410	1,125	250	1,680	21	18	145	177	551	250
15	721	114	410	963	250	1,197	41	18	125	165	452	488
16	565	122	825	963	235	865	30	16	122	157	410	500
17	530	100	905	1,400	193	825	30	18	104	138	374	452
18	500	348	721	621	193	476	25	21	95	250	1,017	428
19	402	520	705	593	193	392	30	21	95	2,738	721	392
20	317	360	691	698	201	325	29	18	80	2,200	512	368
21	276	278	621	649	185	250	25	21	106	1,530	428	350
22	256	260	649	635	177	217	21	21	90	1,017	404	368
23	220	128	579	621	165	185	29	21	78	2,388	392	1,053
24	184	122	350	500	153	177	30	20	73	1,650	434	881
25	168	128	392	476	145	153	21	20	66	1,242	440	392
26	194	490	300	452	125	138	21	30	57	990	368	428
27	264	260	1,888	500	125	138	18	29	59	656	325	452
28	626	260	1,520	579	118	131	21	35	59	586	325	452
29	504	.....	801	600	112	118	21	193	61	551	488	2,200
30	426	.....	769	565	106	98	29	138	68	392	392	2,725
31	315	.....	551	.....	106	.....	21	112	.....	368	.....	3,070

NOTE.—Ice conditions from Jan. 1 to Mar. 24.

Monthly discharge of Schoharie Creek at Prattsville, N. Y., for 1911.

[Drainage area, 240 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	3,250	168	649	2.70	3.121
February	520	100	204	.85	.887
March	1,888	275	578	2.41	2.779
April	3,925	416	1,063	4.43	4.938
May	1,170	106	286	1.19	1.369
June	2,262	73	481	2.00	2.232
July	98	18	41	.17	.193
August	193	16	34	.14	.161
September	368	57	142	.59	.655
October	2,738	57	614	2.56	2.950
November	1,017	15	365	1.52	1.694
December	3,070	225	600	2.50	2.904
The year	3,925	15	422	1.76	23.883

KINDERHOOK CREEK AT ROSSMAN, N. Y.

Location.—On highway bridge at Rossman, N. Y., 3¼ miles above the confluence of the creek, through Stockport Creek, with Hudson River, 1 mile above the mouth of Claversack Creek, which it joins to form Stockport Creek, and 9 miles by road above the village of Hudson.

Records available.—March 17, 1906, to December 31, 1909. Data published also in annual reports of State engineer and surveyor, State of New York.

Drainage area.—331 square miles.

Gage.—Tape and weight type attached to highway bridge; read twice daily; datum unchanged since established.

Channel.—Rock with some soil on sides.

Discharge measurements.—Made from single-span steel highway bridge.

Artificial control.—Low-water flow practically controlled by several power plants and paper mills above the station. Several small lakes also tend to affect low-water flow for short periods.

Winter flow.—Considerably affected by ice.

Accuracy.—Open-channel discharge rating curve very well defined. Determinations of discharge during winter months and extreme low stages liable to large errors. Accurate computation of the diurnal fluctuation of discharge caused by the operation of the mills above the station has been rendered impossible by insufficient funds. It is proposed to install an automatic gage to determine the relation between the daily gage heights heretofore recorded and the true mean gage heights, thus making possible the publication of accurate computations of daily discharge from the inception of the station to date. The gage heights for 1911 are withheld pending this investigation, as no gage heights recorded at this station are true indices of the daily discharge. No measurements were made during 1911.

Cooperation.—Station established by United States Geological Survey in cooperation with State engineer and surveyor of New York.

ESOPUS CREEK NEAR OLIVE BRIDGE, N. Y.

Location.—About 1 mile below Olive Bridge post office, at a weir constructed for the purpose of determining the flow of the creek.

Records available.—October 17, 1906, to December 31, 1911. Data also in annual reports of the New York State engineer and surveyor.

Drainage area.—239 square miles.

Gage.—Friez automatic water-stage register geared 1 to 1 and running 24 hours, in a well 24 inches in diameter, situated 53 feet upstream from the crest of the weir. Water is admitted to this well through a three-fourths-inch pipe extending 16 feet out into the stream in which, spaced 6 inches apart, are one-eighth-inch holes bored vertically through the pipe. The center of this pipe is 18 inches above the bed of the stream. The automatic gage was installed December 5, 1906. From October 17, 1906, to December 5, 1906, head of water on the weir was read three times daily and reduced in the usual manner.

Discharge measurement.—Computations of discharge over the weir are made from a formula deduced from the results of experiments made by the United States Geological Survey in the hydraulic laboratory at Cornell University in series 30, described in Water-Supply Papers 150 and 200. The weir is of concrete 193.90 feet between abutments and 7.54 feet (average height for entire length) above the rock in which it is founded. To form a channel of approach the abutments have been extended upstream at right angles with the axis of the weir for a distance of 16 feet; area of channel of approach below crest of weir, 1,462 square feet. Abutments extend 14 feet above the level of the crest; it is estimated that a flow of 40,000 cubic feet per second can be taken care of.

Winter flow.—The ice which forms between the wing walls which define the channel of approach is kept cut away during the winter so that there may be no change in conditions of flow caused by ice.

Artificial control.—The effect of such slight fluctuations in daily stage as may result from power control above Olive Bridge is practically eliminated from the records by the use of the automatic gage.

Cooperation.—Weir constructed by the Board of Water Supply of the city of New York, by which the discharge data are furnished.

Daily discharge, in second-feet, of Esopus Creek (weir station) near Olive Bridge, N. Y., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	542	308	264	872	683	172	152	92	150	139	512	493
2	1,191	301	256	705	818	128	130	78	86	399	437	475
3	2,350	286	235	598	757	113	128	78	58	277	392	456
4	1,707	525	235	556	662	108	119	78	44	256	375	428
5	1,191	630	286	862	580	127	208	75	38	277	336	358
6	874	358	294	2,082	527	228	256	72	194	235	346	354
7	785	448	144	2,727	475	304	194	81	228	475	708	326
8	620	448	169	1,923	443	646	146	80	201	437	512	345
9	560	410	278	1,564	398	387	130	70	297	375	448	366
10	392	437	333	1,255	375	292	144	62	306	326	446	366
11	375	340	215	1,118	345	292	119	64	294	301	502	350
12	437	278	228	989	322	974	105	67	267	271	636	340
13	475	319	228	901	322	2,482	100	67	216	255	666	333
14	550	264	256	990	304	1,906	100	60	173	228	590	312
15	600	242	312	1,471	282	1,449	110	60	162	217	630	340
16	420	294	358	1,250	271	1,052	122	53	173	206	590	483
17	340	358	264	1,020	256	736	122	64	158	200	542	658
18	350	410	271	856	256	566	127	62	150	2,150	1,054	550
19	358	326	222	748	264	472	106	66	155	3,810	1,030	502
20	375	256	294	856	235	412	105	66	137	2,570	868	452
21	366	228	333	792	218	345	105	53	108	2,005	776	437
22	312	235	467	750	198	313	110	53	136	2,134	694	525
23	264	242	785	690	185	292	102	53	143	2,593	610	1,191
24	235	258	420	620	187	252	187	53	134	1,930	600	967
25	249	286	366	563	185	222	160	53	124	1,427	585	850
26	256	437	375	554	166	202	122	72	133	1,141	491	785
27	271	542	1,930	598	153	188	113	78	124	967	448	840
28	467	308	2,680	674	144	175	105	97	124	798	410	743
29	366	.....	1,454	720	130	150	105	351	124	658	566	600
30	375	.....	1,870	696	128	139	105	272	127	580	525	512
31	294	.....	1,178	.....	113	.....	102	202	.....	532	.....	600

Monthly discharge of Esopus Creek (weir station) near Olive Bridge, N. Y., for 1911.

[Drainage area, 239 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile	
January	2,350	235	579	2.42	2.802
February	630	228	349	1.46	1.527
March	2,680	144	548	2.29	2.655
April	2,727	554	1,000	4.18	4.671
May	818	113	336	1.41	1.616
June	2,482	108	504	2.11	2.355
July	256	100	130	.54	.629
August	351	53	88	.37	.421
September	306	38	159	.67	.740
October	3,810	139	909	3.80	4.392
November	1,054	336	578	2.42	2.701
December	1,191	312	527	2.21	2.552
The year	3,810	38	476	1.99	27.061

ESOPUS CREEK AT MOUNT MARION, N. Y.

Location.—At the single-span steel highway bridge at Pleasant Valley, on the Saugerties road, 1 mile east of Mount Marion station on the West Shore Railroad.

Records available.—April 4, 1907, to December 31, 1911. Data also in annual reports of State engineer and surveyor, State of New York.

Drainage area.—378 square miles.

Gage.—Standard Board of Water Supply chain gage fastened to the downstream side of the bridge, read twice daily. In May, 1908, the floor of the bridge was renewed, but provision was made for accurate gage readings during that period.

Channel.—Straight for about 1,000 feet above the station and 600 feet below, one at all stages. Bed, ledge rock with strata steeply inclined, giving jagged corners and irregular but permanent cross section. Banks rocky and steep; right bank about 40 feet above water level; left bank at least 100 feet high.

Discharge measurements.—At high stages made from the bridge; at low stages at a wading section three-fourths of a mile above the bridge and about three-fourths of a mile below Glenerie Falls; 200 feet from the Kingston-Saugerties road which parallels the creek on the right bank. At the wading section, which is used only when the water is less than 3 feet deep, the bed is gravelly and liable to some change, but the current is swift and good measurements are obtained. The banks at the wading section are of the same character as those at the bridge.

Winter flow.—Affected by ice. Measurements through the ice; gage readings to ice and water.

Accuracy.—Such slight fluctuation in daily stage as may result from the operation of the power plants above Mount Marion probably causes no material error in the estimates of daily discharge.

Cooperation.—Station established and records furnished by Board of Water Supply, city of New York. Gage read morning and afternoon by John Sauer, of Saugerties.

Daily discharge, in second-feet, of Esopus Creek at Mount Marion, N. Y., for 1911.

Date.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	575	480	575	1,590	900	182	173	155	550	151	810	810
2	1,390	469	475	1,259	1,021	169	164	146	335	443	700	780
3	2,500	446	335	1,070	951	164	155	138	178	565	615	735
4	2,676	818	247	930	810	155	146	130	135	427	565	715
5	1,550	980	234	1,000	715	169	234	130	120	387	525	575
6	1,231	559	210	2,480	635	200	222	130	288	355	475	575
7	1,000	700	200	3,660	565	312	210	151	355	325	1,231	585
8	810	700	182	2,580	515	1,000	200	146	335	828	930	515
9	965	639	173	2,280	455	810	200	138	455	650	780	500
10	725	680	191	2,200	435	675	200	130	550	550	725	475
11	600	530	260	1,950	415	575	237	122	550	485	685	475
12	525	433	355	1,707	395	585	222	115	550	265	665	455
13	615	496	355	1,406	375	4,225	206	108	447	387	1,049	455
14	900	412	403	1,566	347	3,618	200	97	387	335	912	415
15	979	376	700	1,833	318	2,700	191	94	355	312	930	443
16	750	458	1,070	1,797	303	2,013	187	94	229	288	930	700
17	585	558	870	1,510	303	1,454	173	94	210	288	852	1,231
18	475	639	585	1,301	288	1,105	191	101	196	1,091	1,430	1,000
19	409	508	475	1,105	288	792	182	101	182	7,500	1,995	870
20	391	399	443	1,390	273	600	173	101	173	4,932	1,617	750
21	391	356	725	1,315	260	515	173	94	164	3,346	1,350	685
22	373	366	888	1,245	247	443	164	94	164	4,375	1,189	700
23	338	378	840	1,119	234	387	164	94	155	4,932	965	1,815
24	301	402	768	1,021	234	318	260	101	146	3,562	965	1,743
25	273	445	725	912	222	282	239	105	138	2,430	1,035	1,430
26	259	680	685	951	206	255	215	111	135	1,887	840	1,259
27	259	843	2,844	1,021	200	234	195	111	130	1,510	768	1,350
28	665	480	5,220	1,000	182	215	177	155	127	1,280	715	1,210
29	550	.....	2,724	965	173	200	164	347	135	1,105	979	780
30	475	.....	3,660	951	164	187	164	525	155	930	852	768
31	375	.....	2,085	.....	164	.....	164	550	.....	780	.....	750

NOTE.—Ice conditions from Jan. 19 to Jan. 26 and from Feb. 7 to Mar. 11.

Monthly discharge of Esopus Creek at Mount Marion, N. Y., for 1911.

[Drainage area, 378 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	2,676	259	784	2.07	2.356
February	980	356	544	1.44	1.501
March	5,220	173	952	2.52	2.906
April	3,660	912	1,504	3.98	4.438
May	1,021	164	406	1.07	1.240
June	4,225	155	818	2.17	2.417
July	260	146	192	.51	.586
August	550	94	152	.40	.464
September	550	120	268	.71	.790
October	7,500	151	1,506	3.99	4.595
November	1,995	475	936	2.48	2.762
December	1,815	415	824	2.18	2.518
The year	7,500	94	739	1.97	26.573

RONDOUT CREEK AT ROSENDALE, N. Y.

Location.—At single-span steel highway bridge at Rosendale.

Records available.—July 6, 1901, to December 31, 1911, except from November 7, 1903, to December, 1905. Data also in annual reports of the State engineer and surveyor, State of New York.

Drainage area.—380 square miles.

Gage.—Standard Board of Water Supply chain gage fastened to the middle panel on the downstream side of the bridge. This gage was established June 1, 1907, to replace the original gage.

Channel.—One at all stages.

Discharge measurements.—At high and medium stages made from the bridge at low stages by wading at a point about 1,000 feet below the bridge.

Winter flow.—The winter flow is obtained by actual measurements at selected stations on the creek through the ice and by wading, and by comparison with gage readings to water and ice at the bridge.

Diversions.—A portion of the water of the creek is diverted by a dam below High Falls and sent through the Delaware & Hudson Canal, and is returned to the creek below the gaging station. At Rock Locks, about 1½ miles below Rosendale, there is an overflow weir from which the discharge of the canal may be approximately determined. The weir, the crest of which is 3.8 feet in length, is at the left end of the lock and is equipped with a standard Board of Water Supply staff gage.

Artificial control.—Slight daily fluctuations in stage are caused by storage at Honk Falls, Napanoch, and to some extent at High Falls. Proper allowance is made in the daily discharge records for the water diverted to the Delaware & Hudson Canal.

Cooperation.—Tables of discharge furnished by the Board of Water Supply of the City of New York, by which the station was assumed on June 1, 1907.

Daily discharge, in second-feet, of Rondout Creek at Rosendale, N. Y., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,056	391	501	2,072	773	213	370	100	559	454	821	220
2	2,755	364	421	1,310	741	248	208	147	486	1,118	757	232
3	3,882	358	370	1,073	685	260	208	94	335	877	709	304
4	2,234	340	352	1,136	629	236	232	82	184	717	629	405
5	1,403	316	328	1,765	581	181	208	97	275	645	581	733
6	840	391	316	3,022	533	228	256	100	393	477	669	741
7	823	364	340	2,840	509	371	268	104	359	1,734	765	701
8	674	377	358	2,840	469	934	196	94	305	1,218	741	725
9	625	364	421	2,448	533	662	178	82	398	805	725	693
10	570	352	377	2,060	501	510	170	116	550	669	725	677
11	524	316	358	1,699	473	935	147	88	790	597	725	661
12	598	304	391	1,424	457	2,269	129	97	527	565	853	629
13	668	304	429	1,271	457	3,749	108	66	335	533	1,019	605
14	1,208	322	437	1,320	456	3,403	88	68	305	501	917	645
15	1,102	279	405	2,714	441	2,025	82	73	341	391	837	965
16	577	268	413	2,192	408	1,236	66	54	347	316	853	1,787
17	573	268	1,127	1,523	401	917	70	39	293	298	853	1,820
18	688	398	1,091	1,330	498	805	138	25	215	4,051	2,240	1,391
19	715	525	693	1,310	770	709	135	36	179	7,702	2,370	1,091
20	584	469	661	2,168	426	669	170	46	158	4,102	1,809	861
21	493	364	853	2,024	357	581	147	36	146	3,476	1,413	983
22	444	322	1,181	1,699	296	469	116	39	182	5,700	1,217	1,928
23	427	252	1,710	1,523	271	437	79	39	178	5,800	1,100	2,120
24	382	310	1,320	1,340	246	391	129	45	154	3,260	1,091	1,699
25	372	370	1,163	1,271	236	352	274	58	141	2,060	1,340	1,369
26	351	469	1,127	1,235	212	316	186	98	162	1,567	1,199	1,163
27	444	565	4,050	1,163	200	316	170	136	154	1,300	1,091	1,350
28	1,098	533	4,900	1,091	199	304	147	133	170	1,136	1,019	1,310
29	570	.....	5,200	917	210	377	135	327	268	957	1,037	1,190
30	497	.....	4,400	821	210	429	123	356	422	837	1,001	1,073
31	396	.....	3,064	.....	234	.....	150	369	.....	805	.....	965

NOTE.—These discharges include the flow of the Delaware & Hudson Canal, which was open from Apr. 17 to Nov. 2. Discharge affected by ice Jan. 1 to Feb. 25.

Monthly discharge of Rondout Creek at Rosendale, N. Y., for 1911.

[Drainage area, 380 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	3,882	351	870	2.29	2.639
February	565	252	366	.96	1.004
March	5,200	316	1,250	3.29	3.792
April	3,022	821	1,687	4.44	4.951
May	773	199	433	1.14	1.316
June	3,749	181	818	2.16	2.399
July	370	66	164	.43	.496
August	369	25	105	.27	.315
September	790	141	310	.83	.912
October	7,702	298	1,763	4.65	5.351
November	2,370	581	1,037	2.73	3.040
December	2,120	220	1,001	2.64	3.039
The year	7,702	25	819	2.16	29.254

PASSAIC RIVER BASIN.

PASSAIC RIVER NEAR CHATHAM, N. J.

Location.—At the second bridge, about 1½ miles upstream from Chatham and about 3 miles above the mouth of Canoe Brook, which enters from the east. There are no important tributaries in the immediate vicinity of the station.

Records available.—February 10, 1903, to December 31, 1911.

Drainage area.—101 square miles.

Gage.—Chain attached to bridge. Datum unchanged.

Channel.—Rocky and fairly permanent; poor distribution of velocity at low stages.

Discharge measurements.—Made from bridge or by wading. No measurements have been made since 1909.

Winter flow.—Affected by ice.

Accuracy.—Good. (See also Water-Supply Paper 281.)

Cooperation.—Station established and maintained by the United States Weather Bureau.

Daily gage height, in feet, of Passaic River near Chatham, N. J., for 1911.

[M. A. Butler, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.3	2.5	3.1	3.4	2.2	2.5	2.3	2.1	3.6	2.1	2.3	2.4
2	2.8	2.4	2.8	3.2	2.2	2.6	2.3	2.1	3.4	2.8	2.2	2.3
3	3.5	2.4	2.5	3.0	2.2	2.5	2.2	2.1	3.2	2.8	2.2	2.3
4	5.5	3.4	2.3	2.8	2.2	2.4	2.2	2.1	3.0	2.6	2.2	2.3
5	.....	3.2	2.2	3.5	2.2	2.3	2.2	2.1	2.8	2.5	2.2	2.3
6	.....	3.0	2.2	3.8	2.2	2.4	2.2	2.1	2.4	2.4	2.2	2.2
7	.....	3.0	2.2	3.6	2.1	2.5	2.2	2.1	2.2	2.7	2.8	2.2
8	.....	3.5	2.2	3.4	2.1	2.5	2.2	2.1	2.1	2.5	2.6	2.2
9	.....	3.5	2.1	3.3	2.1	2.4	2.2	2.1	2.0	2.4	2.5	2.2
10	.....	3.3	2.3	3.2	2.1	2.4	2.2	2.0	2.1	2.3	2.4	2.3
11	.....	3.2	2.3	3.0	2.1	2.6	2.1	2.0	2.2	2.3	2.4	2.5
12	.....	3.0	2.2	2.8	2.1	2.9	2.1	2.0	2.1	2.3	2.3	2.5
13	.....	2.9	2.2	2.6	2.1	3.0	2.1	2.0	2.0	2.2	2.3	2.4
14	.....	.....	2.2	2.4	2.1	3.3	2.1	2.0	2.0	2.2	2.2	2.3
15	3.5	.....	2.8	2.7	2.1	3.3	2.1	2.0	2.0	2.2	2.6	2.7
16	3.3	.....	3.0	2.5	2.1	3.2	2.1	2.1	2.1	2.2	2.6	3.3
17	3.2	.....	2.8	2.4	2.1	3.1	2.1	2.1	2.1	2.2	2.4	3.5
18	3.2	.....	2.7	2.3	2.1	2.9	2.2	2.1	2.1	2.6	3.0	3.3
19	3.1	.....	2.6	2.3	2.1	2.7	2.2	2.1	2.0	3.0	3.4	3.0
20	3.0	.....	2.6	3.0	2.1	2.6	2.1	2.1	2.0	3.3	3.2	2.8
21	3.0	.....	2.5	3.0	2.1	2.5	2.2	2.0	2.0	3.3	3.0	2.6
22	2.9	.....	2.4	2.8	2.1	2.4	2.4	2.0	2.0	3.5	2.8	2.4
23	2.9	.....	2.4	2.8	2.0	2.4	2.3	2.0	2.0	3.8	2.6	3.0
24	2.7	.....	2.3	2.6	2.0	2.4	2.3	2.0	2.0	3.6	2.8	2.8
25	2.6	.....	2.3	2.5	2.0	2.3	2.3	2.1	2.0	3.4	3.0	2.6
26	2.5	.....	2.2	2.4	2.0	2.5	2.3	2.2	2.0	3.1	2.8	2.5
27	2.5	3.5	2.8	2.4	2.0	2.6	2.2	2.3	2.0	2.9	2.7	2.6
28	2.7	3.3	3.3	2.3	2.0	2.5	2.2	2.4	2.0	2.7	2.6	2.4
29	2.6	.....	3.2	2.3	2.0	2.4	2.2	2.4	2.0	2.5	2.8	2.4
30	2.5	.....	3.7	2.2	2.0	2.4	2.2	2.6	2.1	2.4	2.6	2.3
31	2.5	.....	3.5	.....	2.0	.....	2.2	2.8	.....	2.3	.....	2.3

NOTE.—Relation of gage height to discharge was affected by ice from about Jan. 1 to 27, Jan. 30 to Feb. 3, and Feb. 7 to 28. Gage readings were probably to water surface.

Daily discharge, in second-feet, of Passaic River near Chatham, N. J., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	.....	202	310	20	60	31	12	390	12	31	45
2	.....	.....	119	235	20	77	31	12	310	119	20	31
3	.....	.....	60	172	20	60	20	12	235	119	20	31
4	.....	310	31	119	20	45	20	12	172	77	20	31
5	.....	235	20	350	20	31	20	12	119	60	20	31
6	.....	172	20	480	20	45	20	12	45	45	20	20
7	.....	.....	20	390	12	60	20	12	20	97	119	20
8	.....	.....	20	310	12	60	20	12	12	60	77	20
9	.....	.....	12	271	12	45	20	12	8	45	60	20
10	.....	.....	31	235	12	45	20	8	12	31	45	31
11	.....	.....	31	172	12	77	12	8	20	31	45	60
12	.....	.....	20	119	12	144	12	8	12	31	31	60
13	.....	.....	20	77	12	172	12	8	8	20	31	45
14	.....	.....	20	45	12	271	12	8	8	20	20	31
15	.....	.....	119	97	12	271	12	8	8	20	77	97
16	.....	.....	172	60	12	235	12	12	12	20	77	271
17	.....	.....	119	45	12	202	12	12	12	20	45	350
18	.....	.....	97	31	12	144	20	12	12	77	172	271
19	.....	.....	77	31	12	97	20	12	8	172	310	172
20	.....	.....	77	172	12	77	12	12	8	271	235	119
21	.....	.....	60	172	12	60	20	8	8	271	172	77
22	.....	.....	45	119	12	45	45	8	8	350	119	45
23	.....	.....	45	119	8	45	31	8	8	480	77	172
24	.....	.....	31	77	8	45	31	8	8	390	119	119
25	.....	.....	31	60	8	31	31	12	8	310	172	77
26	.....	.....	20	45	8	60	31	20	8	202	119	60
27	.....	.....	119	45	8	77	20	31	8	144	97	77
28	50	.....	271	31	8	60	20	45	8	97	77	45
29	77	.....	235	31	8	45	20	45	8	60	119	45
30	.....	.....	435	20	8	45	20	77	12	45	77	31
31	.....	.....	350	.....	8	.....	20	119	.....	31	.....	31

NOTE.—Daily discharge determined from a discharge rating curve which is well defined below 600 second-feet.

Monthly discharge of Passaic River near Chatham, N. J., for 1911.

[Drainage area, 101 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	1,000	20	153	1.51	1.74	C.
February	310	20	96.7	.957	1.00	C.
March	435	12	94.5	.936	1.08	A.
April	480	20	148	1.47	1.64	A.
May	20	8	12.4	.123	.14	B.
June	271	31	91.0	.901	1.01	A.
July	45	12	20.9	.207	.24	A.
August	119	8	19.3	.191	.22	A.
September	390	8	50.5	.500	.56	A.
October	480	12	120	1.19	1.37	A.
November	310	20	87.4	.865	.97	A.
December	350	20	81.8	.810	.93	A.
The year	1,000	8	81.0	.802	10.90	

NOTE.—Discharge during periods when ice existed estimated on the basis of observer's notes regarding ice and climatologic records.

Mean discharge (estimated), Jan. 1–27, 165 second-feet; Jan. 30–31, 55 second-feet; Feb. 1–3, 35 second-feet; Feb. 7–28, 85 second-feet.

DELAWARE RIVER BASIN.

EAST BRANCH OF DELAWARE RIVER AT HANCOCK, N. Y.

Location.—At the highway bridge half a mile southeast of the Erie Railroad station at Hancock, N. Y., about 1 mile above the junction of East and West branches of Delaware River and 10 miles below the mouth of Beaver Kill, the nearest tributary, which enters from the left.

Records available.—October 14, 1902, to December 31, 1911. Data also in annual reports of New York State engineer and surveyor.

Drainage area.—920 square miles.

Gage.—Standard chain, fastened to upstream left-hand end of bridge; read once daily; datum unchanged.

Channel.—Both banks of medium height, not liable to overflow. Bed composed of rocks and gravel.

Discharge measurements.—Made from the bridge or by wading.

Winter flow.—Affected by needle and cake ice which forms on the control point and produces backwater at the gage.

Accuracy.—Conditions fairly good for accurate determinations of discharge. High-water stage probably affected at times by backwater caused by gorging at junction with the West Branch. Low-water discharge controlled by riffles just below Erie Railroad bridge which sometimes shift and require many measurements and possibly a new discharge rating curve each year. Conditions, however, have been quite permanent during the last two or three years.

Cooperation.—Established and maintained in cooperation with the State engineer and surveyor and, since January 1, 1908, with the United States Weather Bureau.

The following measurement was made by C. S. De Golyer:

July 19, 1911: Gage height, 425 feet; discharge, 2,130 second-feet.

Daily gage height, in feet, of East Branch of Delaware River at Hancock, N. Y., for 1911.

[D. B. Van Etten, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.1	4.1	4.9	4.9	4.1	3.0	3.1	2.6	3.1	3.2	4.3	4.3
2	4.5	4.0	4.8	4.5	4.3	3.1	3.0	2.6	3.0	3.9	4.1	4.2
3	7.5	3.7	4.9	4.3	4.3	3.0	3.0	2.6	2.9	4.1	3.9	4.1
4	7.1	5.1	5.0	4.2	4.1	2.9	3.0	2.6	2.8	3.9	3.8	4.0
5	5.6	5.3	5.1	4.2	4.0	2.9	2.9	2.5	2.7	3.9	3.8	3.9
6	4.9	5.2	5.2	6.4	3.8	3.1	2.9	2.5	3.0	3.8	3.8	3.9
7	4.7	5.3	5.0	8.0	3.8	3.3	3.2	2.7	4.0	4.0	4.1	3.8
8	4.5	5.2	4.8	7.3	3.7	3.2	3.1	2.7	3.5	4.4	4.0	3.8
9	4.3	5.1	4.7	6.5	3.6	3.1	3.0	2.6	3.5	4.3	3.9	3.7
10	4.0	5.1	4.8	5.7	3.6	3.0	2.9	2.6	4.1	4.0	3.8	3.7
11	4.2	5.0	4.6	5.5	3.5	3.2	2.9	2.5	3.8	3.9	3.8	3.8
12	4.0	4.8	4.7	5.3	3.5	6.7	2.8	2.5	3.7	3.8	3.7	3.7
13	4.2	4.9	4.6	5.2	3.5	7.8	2.7	2.5	3.5	3.7	4.6	3.9
14	4.4	5.2	4.8	5.3	3.5	6.9	2.7	2.5	3.4	3.6	4.3	3.8
15	5.0	5.3	5.1	7.2	3.4	5.6	2.7	2.5	3.3	3.5	4.2	3.8
16	4.6	5.2	4.8	6.4	3.3	5.1	2.7	2.5	3.2	3.5	4.2	4.0
17	3.9	5.3	4.1	5.7	3.3	5.0	2.7	2.5	3.2	3.4	4.1	4.
18	4.4	5.4	4.2	5.2	3.3	4.5	2.8	2.4	3.1	3.4	4.1	4.
19	4.6	5.5	4.1	4.9	3.4	4.3	2.7	2.5	3.1	5.4	5.3	4.
20	4.6	5.4	4.1	5.1	3.3	4.0	2.3	2.5	3.0	4.9	4.7	4.
21	4.4	5.3	4.3	5.2	3.2	3.9	2.7	2.5	3.0	4.5	4.6	4.
22	4.5	5.2	4.1	5.1	3.2	3.7	2.7	2.5	3.0	4.8	4.4	4.
23	4.3	5.1	5.2	5.0	3.2	3.7	2.6	2.5	3.0	5.3	4.2	4.
24	4.2	4.9	5.3	4.8	3.2	3.5	2.7	2.4	3.0	5.5	4.2	5.
25	4.1	4.9	5.2	4.6	3.3	3.4	2.6	2.4	3.0	5.0	4.3	4.
26	4.2	4.7	5.2	4.5	3.2	3.3	2.7	2.6	2.9	4.6	4.1	4.
27	4.3	4.9	5.9	4.4	3.1	3.3	2.6	2.7	2.9	4.3	4.0	4.
28	6.0	5.0	9.2	4.3	3.0	3.3	2.6	2.7	2.9	4.2	3.9	4.
29	5.4	.....	6.3	4.3	3.0	3.4	2.6	3.1	2.9	4.1	4.4	4.
30	4.6	.....	6.2	4.2	2.9	3.3	2.6	3.9	3.2	4.0	4.5	4.
31	4.4	.....	5.4	.....	2.9	.....	2.6	3.4	.....	3.9	.....	4.

NOTE.—Relation of gage height to discharge affected by ice Jan. 7 to 13, 18 to 27, and Feb. 4 to Mar. 2. The observer stated that the river was frozen Mar. 25. It is probable that gage heights were slightly affected by backwater from ice during other periods in January.

Daily discharge, in second-feet, of East Branch of Delaware River at Hancock, N. Y., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,930	1,930	600	3,570	1,930	440	525	198	525	620	2,300	2,300
2	2,690	1,750	600	2,690	2,300	525	440	198	440	1,570	1,930	2,110
3	11,300	1,240	600	2,300	2,300	440	440	198	367	1,930	1,570	1,930
4	9,950	.....	500	2,110	1,930	367	440	198	304	1,570	1,400	1,750
5	5,310	.....	400	2,110	1,750	367	367	153	248	1,570	1,400	1,570
6	3,570	.....	350	7,680	1,400	525	367	153	440	1,400	1,400	1,570
7	2,400	.....	350	13,000	1,400	725	620	248	1,750	1,750	1,930	1,400
8	1,800	.....	300	10,600	1,240	620	525	248	965	2,490	1,750	1,400
9	1,400	.....	300	8,000	1,100	525	440	198	965	2,300	1,570	1,240
10	1,000	.....	450	5,580	1,100	440	367	198	1,930	1,750	1,400	1,240
11	900	.....	600	5,050	965	620	367	153	1,400	1,570	1,400	1,400
12	1,200	.....	900	4,540	965	8,640	304	153	1,240	1,400	1,240	1,240
13	1,200	.....	1,000	4,290	965	12,300	248	153	965	1,240	2,900	1,400
14	2,490	.....	1,200	4,540	965	9,290	248	153	840	1,100	2,300	1,400
15	3,800	.....	1,500	10,300	840	5,310	248	153	725	965	2,110	1,400
16	2,900	.....	1,400	7,680	725	4,040	248	153	620	965	2,110	1,750
17	1,570	.....	1,200	5,580	725	3,800	248	153	620	840	1,930	2,690
18	1,200	.....	1,100	4,290	725	2,690	304	113	525	840	1,930	2,300
19	1,000	.....	900	3,570	840	2,300	248	153	525	4,790	4,540	2,110
20	900	.....	900	4,040	725	1,750	80	153	440	3,570	3,120	1,750
21	900	.....	900	4,290	620	1,570	248	153	440	2,690	2,900	1,750
22	800	.....	1,600	4,040	620	1,240	248	153	440	3,340	2,490	1,750
23	800	.....	3,000	3,800	620	1,240	198	153	440	4,540	2,110	2,900
24	700	.....	3,000	3,340	620	965	248	113	440	5,050	2,110	5,310
25	600	.....	2,000	2,900	725	840	198	113	440	3,800	2,300	3,570
26	600	.....	2,000	2,690	620	725	248	198	367	2,900	1,930	2,900
27	600	.....	6,140	2,490	525	725	198	248	367	2,300	1,750	2,900
28	6,430	.....	17,300	2,300	440	725	198	248	367	2,110	1,570	3,120
29	4,790	.....	7,360	2,300	440	840	198	525	367	1,930	2,490	2,110
30	2,900	.....	7,040	2,110	367	725	198	1,570	620	1,750	2,690	1,930
31	2,490	.....	4,790	.....	367	.....	198	840	.....	1,570	.....	2,110

NOTE.—Daily discharge determined from a well-defined discharge rating curve. Discharge Jan. 7 to 13, 3 to 27, and Mar. 1 to 26 estimated from climatologic records and the discharge at Port Jervis.

Monthly discharge of East Branch of Delaware River at Hancock, N. Y., for 1911.

[Drainage area, 920 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
nuary	11,300	.....	2,580	2.81	3.24	B.
ebruary	.....	.....	650	.707	.74	C.
arch	17,300	.....	2,270	2.47	2.85	C.
pril	13,000	2,110	4,730	5.14	5.74	A.
ay	2,300	367	995	1.08	1.24	A.
ne	12,300	367	2,180	2.37	2.64	A.
ly	620	80	305	.332	.38	A.
igust	1,570	113	251	.273	.31	A.
ptember	1,930	248	671	.729	.81	A.
tober	5,050	620	2,140	2.33	2.69	A.
vember	4,540	1,240	2,090	2.27	2.53	A.
cember	5,310	1,240	2,070	2.25	2.59	A.
The year	17,300	80	1,750	1.90	25.76	

NOTE.—Discharge for February estimated from climatologic records and the discharge at Port Jervis.

DELAWARE RIVER AT PORT JERVIS, N. Y.

cation.—At the toll bridge at Port Jervis, 6 miles below the mouth of Mongaup River and 1 mile above the mouth of Neversink River, both entering from the north.

ecords available.—October 12, 1904, to December 31, 1911. Data published also in the annual reports of the New York State engineer and surveyor.

ainage area.—3,250 square miles.

Gage.—Standard chain, fastened to downstream side of bridge; read once daily. Considerable difficulty has been experienced in maintaining the datum of the gage constant. On September 4, 1908, in order to avoid negative readings, a change of about 2 feet was made in the original datum, as nearly as could be determined. The elevation of the datum of the gage is 414.89 feet above mean sea level. A correction varying from +1.7 to +2.0 has been applied to gage heights previous to September 4, 1908, so that all gage heights published by the Survey are referred to the same datum.

Channel.—Bed composed of gravel. Banks high; seldom overflowed.

Discharge measurements.—Made from the highway bridge, except at low stages, when the left channel is sometimes measured by wading.

Winter flow.—Relation of gage height to discharge is usually not greatly affected by ice, except during severe winters. Ice jams sometimes occur at this station and the left channel is particularly subject to effect from ice.

Accuracy.—Conditions of flow at this point are constant and a good discharge rating curve has been developed for all stages. Careful comparison of records at this station with those obtained at Riegelsville and the two Hancock stations indicate that all the discharge data are reliable.

Cooperation.—Station established for the United States Weather Bureau by Irving Righter, city engineer of Port Jervis. Gage heights supplied to the Geological Survey by the Weather Bureau.

The following discharge measurement was made by C. S. De Golyer:
June 21, 1911: Gage height, 3.74 feet; discharge, 4,910 second-feet.

Daily gage height, in feet, of Delaware River at Port Jervis, N. Y., for 1911.

[Jacob Miller, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.0	3.7	3.2	6.6	4.2	2.2	2.6	1.4	3.4	2.6	3.6	4.5
2	3.5	2.7	3.2	5.0	4.2	2.2	2.4	1.4	3.2	3.1	4.1	3.8
3	5.7	2.5	2.7	4.6	4.1	2.4	2.3	1.4	2.3	4.2	3.8	3.7
4	8.0	2.4	2.7	4.4	3.9	2.3	2.1	1.4	2.4	3.8	3.5	3.5
5	6.0	3.1	2.6	4.5	3.8	2.2	2.1	1.3	2.2	3.4	3.5	3.5
6	5.4	3.5	2.5	5.5	3.6	2.4	2.0	1.4	2.1	3.2	3.3	3.4
7	4.8	3.0	2.2	8.2	3.4	2.8	2.0	1.5	2.2	3.4	3.6	3.4
8	4.4	2.8	2.2	8.5	3.1	3.0	2.0	1.5	3.2	4.2	3.8	3.3
9	4.1	2.8	2.0	7.2	3.0	3.0	2.2	1.5	3.0	3.9	3.7	3.3
10	3.8	3.0	2.2	6.5	2.8	2.8	2.0	1.7	2.9	3.8	3.5	3.2
11	3.4	3.0	2.7	6.2	2.7	2.9	1.9	1.6	3.7	3.5	3.4	3.2
12	3.3	2.8	2.7	5.9	2.6	4.4	1.8	1.4	3.4	3.3	3.2	3.3
13	3.7	2.6	3.2	5.5	2.6	8.1	1.8	1.3	3.0	3.4	3.2	3.3
14	3.7	2.5	3.7	5.3	2.5	8.4	1.7	1.2	3.0	3.2	4.2	3.3
15	5.4	2.3	4.3	6.8	2.4	7.1	1.6	1.2	2.8	3.0	3.9	3.3
16	5.4	2.3	4.3	6.9	2.8	5.9	1.5	1.2	2.5	2.9	3.7	3.8
17	5.2	2.3	4.2	6.3	2.8	5.5	1.5	1.2	2.5	3.1	3.7	4.8
18	3.8	2.7	3.9	5.6	2.6	5.2	1.6	1.3	2.4	3.1	3.7	4.8
19	3.5	2.7	3.7	5.4	2.9	4.6	1.6	1.3	2.1	6.0	5.2	4.4
20	3.5	2.6	3.7	5.3	2.9	4.1	1.6	1.2	2.2	5.8	5.2	4.1
21	3.5	2.8	3.5	6.5	2.8	3.7	1.7	1.3	2.1	5.0	4.7	3.9
22	3.4	2.8	3.9	5.8	2.7	3.4	1.9	1.3	1.9	5.6	4.5	3.8
23	3.4	2.6	4.4	6.2	2.7	3.4	1.9	1.2	2.0	5.6	4.2	4.3
24	3.2	2.5	4.2	5.7	2.6	3.2	2.0	1.08	2.0	6.4	4.0	6.3
25	3.0	2.5	4.2	5.2	2.7	3.1	1.9	1.2	1.87	5.8	4.2	5.9
26	2.6	2.4	4.2	4.5	2.5	3.4	1.7	1.5	1.87	5.2	4.1	5.0
27	2.9	2.5	5.0	4.5	2.5	2.8	1.7	1.7	1.87	4.8	3.8	4.9
28	3.0	2.5	10.7	4.3	2.4	2.6	1.6	1.7	1.87	4.5	3.7	5.2
29	6.5	.....	8.1	4.2	2.2	3.1	1.6	2.2	2.0	4.2	3.7	4.6
30	5.2	.....	6.9	4.0	2.0	2.9	1.5	3.3	2.3	4.0	4.3	4.1
31	4.9	.....	6.8	.....	2.0	.....	1.5	3.5	.....	3.6	.....	4.0

NOTE.—No direct information regarding the effect of ice at this station, but comparison with climatologic records and the records at Riegelsville indicates that the relation of gage height to discharge was probably affected by ice Jan. 1, Jan. 16, and 17, and Mar. 1 to 2; and doubtless also for short intervals at other times during January, February, and March.

Daily discharge, in second-feet, of Delaware River at Port Jervis, N. Y., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3,800	4,970	2,200	18,000	6,620	1,570	2,260	665	4,100	2,260	4,670	7,730
2	4,380	2,450	2,300	9,780	6,620	1,570	1,900	665	3,570	3,320	6,270	5,280
3	13,000	2,080	2,450	8,120	6,270	1,900	1,730	665	1,730	6,620	5,280	4,970
4	27,500	1,900	2,450	7,350	5,600	1,730	1,420	665	1,900	5,280	4,380	4,380
5	14,600	3,320	2,260	7,730	5,280	1,570	1,420	590	1,570	4,100	4,380	4,380
6	11,600	4,380	2,080	12,100	4,670	1,900	1,280	665	1,420	3,570	3,830	4,100
7	8,930	3,080	1,570	29,000	4,100	2,650	1,280	740	1,570	4,100	4,670	4,100
8	7,350	2,650	1,570	31,200	3,320	3,080	1,280	740	3,570	6,620	5,280	3,830
9	6,270	2,650	1,280	21,800	3,080	3,080	1,570	740	3,080	5,600	4,970	3,830
10	5,280	3,080	1,570	17,400	2,650	2,650	1,280	920	2,860	5,280	4,380	3,570
11	4,100	3,080	2,450	15,700	2,450	2,860	1,150	825	4,970	4,380	4,100	3,570
12	3,830	2,650	2,450	14,100	2,260	7,350	1,030	665	4,100	3,830	3,570	3,830
13	4,970	2,260	3,570	12,100	2,260	28,200	1,030	590	3,080	4,100	3,570	3,830
14	4,970	2,080	4,970	11,100	2,080	30,500	920	520	3,080	3,570	6,620	3,830
15	11,600	1,730	6,980	19,200	1,900	21,200	825	520	2,650	3,080	5,600	3,830
16	9,000	1,730	6,980	19,800	2,650	14,100	740	520	2,080	2,860	4,970	5,280
17	7,000	1,730	6,620	16,200	2,650	12,100	740	520	2,080	3,320	4,970	8,930
18	5,280	2,450	5,600	12,500	2,260	10,700	825	590	1,900	3,320	4,970	8,930
19	4,380	2,450	4,970	11,600	2,860	8,120	825	590	1,420	14,600	10,700	7,350
20	4,380	2,260	4,970	11,100	2,860	6,270	825	520	1,570	13,500	10,700	6,270
21	4,380	2,650	4,380	17,400	2,650	4,970	920	590	1,420	9,780	8,520	5,600
22	4,100	2,650	5,600	13,500	2,450	4,100	1,150	590	1,150	12,500	7,730	5,280
23	4,100	2,260	7,350	15,700	2,450	4,100	1,150	520	1,280	12,500	6,620	6,980
24	3,570	2,080	6,620	13,000	2,260	3,570	1,280	438	1,280	16,800	5,930	16,200
25	3,080	2,080	6,620	10,700	2,450	3,320	1,150	520	1,110	13,500	6,620	14,100
26	2,260	1,900	6,620	7,730	2,080	4,100	920	740	1,110	10,700	6,270	9,780
27	2,860	2,080	9,780	7,730	2,080	2,650	920	920	1,110	8,930	5,280	9,350
28	3,080	2,080	48,400	6,980	1,900	2,260	825	920	1,110	7,730	4,970	10,700
29	17,400	.....	28,200	6,620	1,570	3,320	825	1,570	1,280	6,620	4,970	8,120
30	10,700	.....	19,800	5,930	1,280	2,860	740	3,830	1,730	5,930	6,980	6,270
31	9,350	.....	19,200	.....	1,280	.....	740	4,380	.....	4,670	.....	5,930

NOTE.—Daily discharge determined from a well-defined discharge rating curve. Discharge Jan. 1, 16, and 17 and Mar. 1 and 2 determined from discharge at Riegelsville and climatologic records. Probably no material backwater from ice during the remainder of January, February, and March.

Monthly discharge of Delaware River at Port Jervis, N. Y., for 1911.

[Drainage area, 3,250 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	27,500	2,260	7,330	2.26	2.61	A.
February	4,970	1,730	2,530	.778	.81	A.
March	48,400	1,280	7,480	2.30	2.65	A.
April	31,200	5,930	13,700	4.22	4.71	A.
May	6,620	1,280	3,060	.942	1.09	A.
June	30,500	1,570	6,610	2.03	2.26	A.
July	2,260	740	1,130	.348	.40	A.
August	4,380	438	901	.277	.32	A.
September	4,970	1,110	2,160	.665	.74	A.
October	16,800	2,260	6,870	2.11	2.43	A.
November	10,700	3,570	5,730	1.76	1.96	A.
December	16,200	3,570	6,460	1.99	2.29	A.
The year	48,400	438	5,330	1.64	22.27	

NOTE.—Comparison of the discharge at Port Jervis with the discharge at Riegelsville and at Hancock indicates that these records are exceptionally good.

DELAWARE RIVER AT RIEGELSVILLE, N. J.

Location.—At the toll suspension bridge between Riegelsville, N. J., and Riegelsville, Pa., 9 miles below the mouth of Lehigh River (entering from the west) and 600 feet above the mouth of the Musconetcong (entering from the east).

Records available.—July 3, 1906, to December 31, 1911.

Drainage area.—6,430 square miles.

Gage.—Chain, attached to the bridge. Datum unchanged. This gage has not been checked with a level since 1909, and may therefore be somewhat in error as a result of stretch of chain and changes in suspension bridge.

Channel.—The station is in a deep hole which extends about half a mile downstream to a permanent control composed of bowlders averaging 2 to 3 feet in diameter; immediately below the control are heavy rapids. Both banks are high and not subject to overflow.

Discharge measurements.—Made from the bridge. No measurements in 1911.

Winter flow.—Relation between gage height and discharge affected by ice only during severe winters.

Diversions.—The Delaware division of the Pennsylvania Canal, running from Easton, Pa., to Bristol, Pa., diverts water from the Lehigh at its mouth and at low stages takes practically the entire discharge of this tributary. The water is turned out of this canal during the winter period, or from about the middle of December to the last of March, but throughout the remainder of the year the average discharge is 250 to 300 second-feet.

Accuracy.—Conditions for obtaining accurate discharge data are very good, and an excellent discharge rating curve has been developed. The relation between gage height and discharge is affected by backwater from the Musconetcong only at rare intervals. Comparison of the records of flow with those at Port Jervis, N. Y., and Hancock, N. Y., show that full reliance can be placed on the estimates of monthly discharge at Riegelsville.

Daily gage height, in feet, of Delaware River at Riegelsville, N. J., for 1911.

[John H. Deemer, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.7	4.6	4.2	8.6	5.6	3.7	3.4	2.6	9.0	3.6	5.5	5.9
2	5.2	4.4	4.4	7.4	5.9	3.8	3.3	2.5	7.0	5.9	5.3	5.5
3	6.6	4.1	4.4	6.6	5.7	3.7	3.2	2.45	5.8	6.3	5.4	5.3
4	12.2	4.5	4.0	6.1	5.5	3.4	3.2	2.7	5.0	5.9	5.0	5.2
5	9.8	5.2	3.7	6.8	5.3	3.4	3.1	2.6	4.5	5.2	4.8	5.0
6	7.3	4.3	3.7	7.3	4.9	3.4	2.95	2.6	4.2	4.8	4.7	4.8
7	6.3	3.9	3.6	10.7	4.7	3.5	3.0	2.5	4.5	4.7	5.4	4.8
8	6.0	3.9	3.4	11.8	4.5	3.8	2.95	2.65	4.4	5.0	5.4	4.7
9	5.9	3.8	3.4	10.5	4.3	3.8	3.1	2.65	4.7	5.5	5.2	4.7
10	5.3	3.6	3.5	9.6	4.3	3.6	2.95	2.6	4.7	5.1	5.0	4.6
11	5.0	3.7	4.1	8.8	4.2	3.3	2.95	2.5	4.7	4.8	4.8	4.7
12	4.7	3.8	3.9	8.3	4.1	5.4	2.9	2.5	5.5	4.8	4.7	4.7
13	4.8	4.1	4.3	7.8	3.9	12.0	2.9	2.35	4.7	4.6	4.9	4.7
14	5.6	4.0	4.4	7.5	3.8	13.5	2.85	2.3	4.4	4.4	5.4	4.6
15	6.8	3.8	5.2	8.3	3.8	12.2	3.1	2.25	4.1	4.2	5.6	4.7
16	7.6	3.4	6.4	9.9	3.7	9.5	2.9	2.3	4.1	4.1	5.4	5.3
17	6.1	3.5	5.7	8.9	3.6	8.1	2.85	2.25	3.9	4.1	5.2	6.6
18	5.2	3.7	5.6	8.0	3.7	7.6	3.7	2.2	3.7	5.4	5.8	7.0
19	4.8	4.4	5.2	7.2	3.8	6.7	3.2	2.25	3.6	8.9	7.4	6.5
20	4.6	4.0	5.0	7.7	3.9	6.0	3.1	2.05	3.5	9.6	8.2	6.1
21	4.8	3.6	4.9	9.3	3.8	5.3	2.9	2.05	3.3	8.5	7.3	5.5
22	4.9	3.6	4.8	8.7	3.7	4.9	3.2	2.15	3.3	8.7	6.6	5.4
23	4.7	3.6	5.4	9.0	3.6	4.7	2.95	2.0	3.2	9.9	6.2	6.4
24	4.2	3.5	6.3	8.5	3.5	4.6	3.0	2.05	3.2	10.7	6.2	7.7
25	4.0	3.5	6.2	7.8	3.4	4.5	3.6	2.2	3.1	9.7	6.2	8.2
26	4.0	4.2	5.5	7.1	3.4	4.4	3.4	2.55	3.1	8.5	6.1	7.3
27	3.9	4.5	5.9	6.6	3.3	4.3	3.1	2.7	2.95	7.6	5.8	7.2
28	4.3	4.7	12.9	6.3	3.2	4.2	2.9	2.85	2.95	7.0	5.5	7.3
29	4.7	.....	13.0	6.0	3.2	4.0	2.85	3.0	3.1	6.5	5.7	6.6
30	7.2	.....	9.6	5.8	3.1	3.9	2.65	6.1	3.6	6.1	5.7	5.8
31	5.8	.....	10.1	.....	3.2	.....	2.7	7.2	.....	5.7	.....	5.7

NOTE.—Relation of gage height to discharge not affected by ice during 1911. Water turned into the canal Mar. 10 and withdrawn Dec. 8.

Daily discharge, in second-feet, of Delaware River at Riegelsville, N. J., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	8,490	8,160	6,870	24,500	11,600	5,360	4,530	2,600	26,600	5,080	11,200	12,700
2	10,200	7,510	7,510	18,800	12,700	5,650	4,260	2,400	17,100	12,700	10,500	11,200
3	15,400	6,560	7,510	15,400	12,000	5,360	4,000	2,300	12,400	14,200	10,900	10,500
4	45,700	7,830	6,250	13,500	11,200	4,530	4,000	2,810	9,500	12,700	9,500	10,200
5	31,000	10,200	5,360	16,300	10,500	4,530	3,750	2,600	7,830	10,200	8,820	9,500
6	18,400	7,190	5,360	18,400	9,160	4,530	3,380	2,600	6,870	8,820	8,490	8,820
7	14,200	5,950	5,080	36,300	8,490	4,800	3,500	2,400	7,830	8,490	10,900	8,820
8	13,100	5,950	4,530	43,100	7,830	5,650	3,380	2,700	7,510	9,500	10,900	8,490
9	12,700	5,650	4,530	35,100	7,190	5,650	3,750	2,700	8,490	11,200	10,200	8,490
10	10,500	5,080	4,800	29,900	7,190	5,080	3,380	2,600	8,490	9,840	9,500	8,160
11	9,500	5,360	6,560	25,600	6,870	4,260	3,380	2,400	8,490	8,820	8,820	8,490
12	8,490	5,650	5,950	23,000	6,560	10,900	3,260	2,400	11,200	8,820	8,490	8,490
13	8,820	6,560	7,190	20,700	5,950	44,400	3,260	2,100	8,490	8,160	9,160	8,490
14	11,600	6,250	7,510	19,300	5,650	54,600	3,140	2,010	7,510	7,510	10,900	8,160
15	16,300	5,650	10,200	23,000	5,650	45,700	3,750	1,920	6,560	6,870	11,600	8,490
16	19,700	4,530	14,600	31,600	5,360	29,300	3,260	2,010	6,560	6,560	10,900	10,500
17	13,500	4,800	12,000	26,100	5,080	22,100	3,140	1,920	5,950	6,560	10,200	15,400
18	10,200	5,360	11,600	21,600	5,360	19,700	5,360	1,830	5,360	10,900	12,400	17,100
19	8,820	7,510	10,200	18,000	5,650	15,800	4,000	1,920	5,080	26,100	18,800	15,000
20	8,160	6,250	9,500	20,200	5,950	13,100	3,750	1,580	4,800	29,900	22,600	13,500
21	8,820	5,080	9,160	28,200	5,650	10,500	3,260	1,580	4,260	24,000	18,400	11,200
22	9,160	5,080	8,820	25,000	5,360	9,160	4,000	1,740	4,260	25,000	15,400	10,900
23	8,490	5,080	10,900	26,600	5,080	8,490	3,380	1,500	4,000	31,600	13,900	14,600
24	6,870	4,800	14,200	24,000	4,800	8,160	3,500	1,580	4,000	36,300	13,900	20,200
25	6,250	4,800	13,900	20,700	4,530	7,830	5,080	1,830	3,750	30,400	13,900	22,600
26	6,250	6,870	11,200	17,500	4,530	7,510	4,530	2,500	3,750	24,000	13,500	18,400
27	5,950	7,830	12,700	15,400	4,260	7,190	3,750	2,810	3,380	19,700	12,400	18,000
28	7,190	8,490	50,400	14,200	4,000	6,870	3,260	3,140	3,380	17,100	11,200	18,400
29	8,490	.....	51,100	13,100	4,000	6,250	3,140	3,500	3,750	15,000	12,000	15,400
30	18,000	.....	29,900	12,400	3,750	5,950	2,700	13,500	5,080	13,500	12,000	12,400
31	12,400	.....	32,700	.....	4,000	.....	2,810	18,000	.....	12,000	.....	12,000

NOTE.—Daily discharge determined from a well-defined discharge rating curve.

Monthly discharge of Delaware River at Riegelsville, N. J., for 1911.

[Drainage area, 6,430 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	45,700	5,950	12,700	1.98	2.28	A.
February	10,200	4,530	6,290	.978	1.02	A.
March	51,100	4,530	12,800	2.02	2.33	A.
April	43,100	12,400	22,600	3.56	3.97	A.
May	12,700	3,750	6,640	1.07	1.23	A.
June	54,600	4,260	13,000	2.05	2.29	A.
July	5,360	2,700	3,670	.613	.71	A.
August	18,000	1,500	3,140	.530	.61	A.
September	26,600	3,380	7,410	1.19	1.33	A.
October	36,300	5,080	15,200	2.41	2.78	A.
November	22,600	8,490	12,000	1.91	2.13	A.
December	22,600	8,160	12,400	1.94	2.24	A.
The year	54,600	1,500	10,700	1.70	22.92	

NOTE.—In order to determine the discharge per square mile and the run-off depth in inches, 270 second-feet were added Mar. 10 to Dec. 7, 1910, before computing the discharge per square mile. Hence the first three columns indicate the actual quantity of water available in the river, and the two remaining columns represent the actual run-off from the drainage area above Riegelsville, including the discharge of the canal.

WEST BRANCH OF DELAWARE RIVER AT HANCOCK, N. Y.

Location.—At the toll suspension bridge over Delaware River, one-half mile west of the Erie Railroad station at Hancock, N. Y., about 1 mile above the junction of the East and West branches of the Delaware, and about 10 miles below the mouth of Oquaga Creek, the nearest tributary, which enters from the right.

Records available.—October 15, 1902, to December 31, 1911. Data published also in annual reports of the New York State engineer and surveyor.

Drainage area.—680 square miles.

Gage.—Standard chain, fastened to the upstream side of the bridge; read once daily; datum unchanged.

Channel.—Bed of river composed of gravel. One channel at all stages.

Discharge measurements.—Made from the bridge or by wading.

Winter flow.—Affected considerably by ice below the control point.

Accuracy.—Conditions for determination of discharge not good. High-water stage affected by backwater from East Branch; low-water stage controlled by riffles about 800 feet below the bridge; frequent changes in the channel require many measurements and frequent new discharge rating curves.

Cooperation.—Established and maintained in cooperation with the State engineer and surveyor of New York, and since January 1, 1908, with the United States Weather Bureau.

Discharge measurements of West Branch of Delaware River at Hancock, N. Y., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.ft.*
June 17	C. S. De Golyer	5.21	2,360
19	do	4.44	1,360

Daily gage height, in feet, of West Branch of Delaware River at Hancock, N. Y., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.3	3.8	4.8	4.8	3.9	2.9	3.3	2.7	3.1	2.8	4.5	4.0
2	5.1	4.1	3.9	4.4	3.8	3.0	3.2	2.6	2.9	3.7	4.2	4.0
3	8.0	3.8	4.1	4.2	4.0	2.8	3.1	2.5	2.9	3.6	4.0	3.9
4	6.8	3.5	3.8	4.2	3.8	2.8	2.9	2.5	2.9	3.3	3.8	3.7
5	5.4	4.4	3.8	4.3	3.7	3.0	3.0	2.5	2.8	3.4	3.7	3.7
6	5.0	5.8	3.5	6.9	3.6	3.2	2.9	3.0	3.5	3.2	4.0	3.5
7	4.8	4.1	3.4	7.6	3.5	3.3	3.3	3.3	3.6	3.9	3.9	3.5
8	4.5	4.5	3.1	6.8	3.4	3.2	3.1	3.8	3.3	3.8	3.9	3.5
9	4.5	5.1	3.1	6.2	3.4	3.0	2.8	2.7	3.0	3.8	3.8	3.7
10	4.0	5.1	3.2	5.6	3.3	3.0	2.9	2.6	4.5	3.6	3.7	3.6
11	3.9	4.4	3.3	5.5	3.3	2.9	2.9	2.7	4.1	3.5	3.8	3.8
12	4.2	3.9	3.7	5.3	3.3	5.3	2.7	2.6	3.9	3.6	4.0	3.8
13	4.8	4.0	3.9	5.0	3.4	6.3	2.7	2.5	3.7	3.5	4.0	3.8
14	5.0	4.3	4.4	5.1	3.3	6.2	2.6	2.6	3.4	3.3	3.9	4.0
15	5.8	4.0	5.8	6.2	3.2	5.4	2.6	2.5	3.3	3.3	3.9	4.0
16	4.8	3.8	4.5	5.7	3.1	5.1	2.5	2.6	3.2	3.2	3.7	4.4
17	4.1	3.8	4.1	5.3	3.1	4.9	2.7	2.5	3.0	3.0	4.1	4.9
18	3.9	4.1	4.1	5.0	3.1	4.7	2.8	2.5	3.1	3.7	5.4	4.7
19	3.6	4.5	3.8	4.7	3.2	4.4	2.7	2.7	3.0	4.9	4.6	4.5
20	4.0	4.1	3.6	4.9	3.1	4.1	2.6	2.5	3.0	4.7	4.3	4.1
21	4.2	4.1	3.6	4.8	3.1	3.9	2.7	2.5	2.9	4.3	4.4	4.0
22	3.9	4.3	4.0	4.9	3.1	3.9	2.5	2.5	2.9	4.3	4.0	4.0
23	3.7	4.3	4.6	4.9	3.0	3.4	2.5	2.5	2.9	5.5	4.1	5.5
24	3.5	4.0	4.6	4.6	3.0	3.3	2.7	2.5	2.8	5.3	4.2	5.6
25	3.6	4.1	3.9	4.4	3.4	3.3	2.9	2.5	2.9	4.8	4.0	5.0
26	3.4	3.8	4.3	4.3	3.2	3.2	2.7	2.7	2.8	4.5	3.8	4.8
27	3.4	3.9	6.8	4.1	3.1	3.0	2.7	2.7	2.7	4.3	4.2	4.9
28	6.9	4.6	8.8	4.1	3.1	3.6	2.7	2.9	2.7	4.2	4.1	4.7
29	5.8	.....	6.2	4.0	3.0	3.4	2.4	3.0	2.7	4.0	4.0	4.0
30	5.2	.....	5.1	3.9	3.0	3.2	2.6	3.3	2.9	3.8	4.0	3.8
31	4.0	.....	5.4	.....	2.9	.....	2.6	3.2	.....	3.8	.....	3.8

NOTE.—Relation of gage height to discharge affected by ice Jan. 7 to 13, 20 to 27, and about Feb. 1 to Mar. 19. The gage height may also have been slightly affected by ice at other times during January and March.

Daily discharge, in second-feet, of West Branch of Delaware River at Hancock, N. Y., for 1911.

Day.	Jan.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,240	400	1,850	845	210	400	140	295	175	1,470	935
2	2,280	400	1,350	755	250	345	110	210	670	1,130	935
3	9,700	400	1,130	935	175	295	83	210	595	935	845
4	5,930	350	1,130	755	175	210	83	210	400	755	670
5	2,780	350	1,240	670	250	250	83	175	460	670	670
6	2,130	300	6,210	595	345	210	250	525	345	935	525
7	1,600	250	8,360	525	400	400	400	595	845	845	525
8	1,200	200	5,930	460	345	295	755	400	755	845	525
9	900	200	4,450	460	250	175	140	250	755	755	670
10	700	300	3,150	400	250	210	110	1,470	595	670	595
11	600	400	2,960	400	210	210	140	1,030	525	755	755
12	800	600	2,610	400	2,610	140	110	845	595	935	755
13	800	700	2,130	460	4,680	140	83	670	525	935	755
14	2,130	800	2,280	400	4,450	110	110	460	400	845	935
15	3,560	1,000	4,450	345	2,780	110	83	400	400	845	935
16	1,850	900	3,350	295	2,280	83	110	345	345	670	1,350
17	1,030	800	2,610	295	1,990	140	83	250	250	1,030	1,990
18	845	700	2,130	295	1,720	175	83	295	670	2,780	1,720
19	595	600	1,720	345	1,350	140	140	250	1,990	1,590	1,470
20	600	595	1,990	295	1,030	110	83	250	1,720	1,240	1,030
21	600	595	1,850	295	845	140	83	210	1,240	1,350	935
22	500	935	1,990	295	845	83	83	210	1,240	935	935
23	500	1,590	1,990	250	460	83	83	210	2,960	1,030	2,960
24	400	1,590	1,590	250	400	140	83	175	2,610	1,130	3,150
25	400	845	1,350	460	400	210	83	210	1,850	935	2,130
26	350	1,240	1,240	345	345	140	140	175	1,470	755	1,850
27	400	5,930	1,030	295	250	140	140	140	1,240	1,130	1,990
28	6,210	12,600	1,030	295	595	140	210	140	1,130	1,030	1,720
29	3,560	4,450	935	250	460	60	250	140	935	935	935
30	2,440	2,280	845	250	345	110	400	210	755	935	755
31	935	2,780	.....	210	.....	110	345	.....	755	.....	755

NOTE.—Daily discharge determined from a fairly well defined discharge rating curve. Discharge Jan. 7 to 13, 20 to 27, and Mar. 1 to 19 estimated from climatologic records and the discharge at Port Jervis.

Monthly discharge of West Branch of Delaware River at Hancock, N. Y., for 1911.

[Drainage area, 680 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	9,700	350	1,860	2.74	3.16	C.
February	.....	.....	450	.662	.69	D.
March	12,600	200	1,450	2.13	2.46	C.
April	8,360	845	2,500	3.68	4.11	A.
May	935	210	423	.622	.72	B.
June	4,680	175	1,020	1.50	1.67	A.
July	400	60	178	.262	.30	B.
August	755	83	164	.241	.28	B.
September	1,470	140	365	.537	.60	B.
October	2,960	175	942	1.39	1.60	A.
November	2,780	670	1,030	1.51	1.68	A.
December	3,150	525	1,180	1.74	2.01	A.
The year	12,600	60	965	1.42	19.28	

NOTE.—Discharge for February estimated from climatologic records and the discharge at Port Jervis.

MONGAUP RIVER AT RIO, N. Y.

Location.—At the steel highway bridge on Partridge ranch, near Rio, 6 miles above Mongaup village and some 7 miles above the mouth of the stream.

Records available.—August 8, 1909, to December 31, 1911. Data also in annual report of New York State engineer and surveyor.

Drainage area.—189 square miles.

Gage.—Standard chain, attached to the downstream side of the bridge; read twice daily; datum unchanged.

Channel.—At low and medium stages divided into two parts by an island just below the bridge. Banks high and overflow only during high stages.

Discharge measurements.—At high stages made from the bridge; at low stages by wading.

Accuracy.—Conditions fairly good except at low-water stages, when the current becomes rather sluggish. A good discharge rating curve has been developed for stages below 3 feet.

Cooperation.—Established December 8, 1906, by Chas. H. Cooke, civil engineer, New York City, in cooperation with the United States Geological Survey and the New York State engineer and surveyor. Observations prior to 1909 unreliable and hence not published.

The following discharge measurement was made by C. C. Covert:
October 11, 1911: Gage height, 1.32 feet; discharge, 202 second-feet.

Daily gage height, in feet, of Mongaup River at Rio, N. Y., for 1911.

[Mrs. C. S. Rolles, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	1.46	.....	2.7	1.5	1.19	1.18	.79	1.46	1.19	1.5	1.55
2	.....	1.40	.....	2.6	1.7	1.12	1.08	.73	1.23	2.05	1.48	1.6
3	.....	1.20	.....	1.8	1.75	1.08	1.00	.77	1.03	1.65	1.39	1.42
4	.....	1.41	.....	1.75	1.7	.98	1.02	.79	.90	1.5	1.34	1.38
5	.....	.....	.....	1.9	1.6	.98	.99	.79	1.12	1.39	1.32	1.49
6	.....	.....	.....	2.8	1.5	1.14	.96	.78	1.09	1.35	1.32	1.45
7	.....	.....	.....	2.6	1.44	1.29	1.19	.84	1.00	1.7	1.6	1.5
8	.....	.....	.....	2.45	1.40	1.25	1.08	.83	1.02	1.6	1.45	1.65
9	.....	.....	.....	2.25	1.40	1.15	.95	.81	1.04	1.55	1.44	1.5
10	.....	.....	.....	2.4	1.38	1.05	.95	.75	1.27	1.49	1.35	1.5
11	.....	.....	.....	2.4	1.34	2.4	.94	.73	1.06	1.34	1.31	1.45
12	.....	.....	1.25	2.2	1.30	3.8	.90	.71	1.00	1.28	1.31	1.5
13	.....	.....	1.5	2.1	1.28	4.2	.88	.67	.86	1.18	1.9	1.48
14	.....	.....	1.8	3.2	1.26	3.6	.89	.71	.85	1.14	1.6	1.48
15	.....	.....	2.15	3.5	1.24	2.8	.89	.67	.79	1.11	1.55	1.7
16	.....	.....	2.3	2.7	1.22	2.4	.85	.70	.87	1.10	1.55	2.1
17	.....	.....	1.9	2.35	1.20	2.2	.90	.64	.86	1.08	1.49	2.3
18	.....	.....	1.8	2.15	1.26	1.95	.95	.66	.85	1.48	2.2	2.0
19	.....	.....	1.65	2.0	1.28	1.6	.89	.66	.83	2.5	2.45	1.75
20	.....	.....	1.6	2.7	1.19	1.6	.82	.66	.79	2.2	2.15	1.55
21	.....	.....	1.7	2.5	1.11	1.5	.85	.68	.77	2.15	1.9	1.6
22	.....	.....	2.6	2.3	1.08	1.45	.84	.62	.78	2.6	1.8	1.9
23	.....	.....	2.05	3.0	1.06	1.45	.77	.70	.82	3.0	1.75	2.25
24	.....	.....	2.1	2.4	1.04	1.38	1.17	.60	.79	2.5	1.65	2.5
25	.....	.....	2.15	2.2	1.05	1.28	1.25	.80	.82	2.2	1.95	2.4
26	.....	.....	2.4	1.95	1.02	1.22	1.08	.99	.83	2.0	1.8	2.7
27	.....	.....	3.1	1.8	1.00	1.26	.94	.78	.81	1.85	1.7	2.6
28	.....	.....	3.8	1.7	.94	1.36	.91	.86	.85	1.7	1.6	2.5
29	1.9	.....	2.8	1.55	.91	1.25	.87	1.48	.85	1.65	1.75	1.95
30	1.65	.....	3.0	1.6	.95	1.20	.79	1.75	1.37	1.6	1.7	1.6
31	1.5	.....	2.6	.....	.98	.....	.79	1.7	.....	1.5	.....	1.6

NOTE.—No information available regarding backwater from ice. River probably open and unaffected by ice Jan. 29 to Feb. 4.

Daily discharge, in second-feet, of Mongaup River at Rio, N. Y., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	284	.....	1,020	300	182	178	61	251	160	300	322
2	.....	260	.....	950	395	157	143	50	173	590	292	345
3	.....	185	.....	445	420	143	115	57	116	370	256	268
4	.....	264	.....	420	395	109	122	61	84	265	236	252
5	.....	.....	.....	500	345	109	112	61	140	226	228	296
6	.....	.....	.....	1,100	300	164	103	59	131	212	228	280
7	.....	.....	.....	950	276	216	182	72	108	395	345	300
8	.....	.....	.....	845	260	202	143	70	113	345	280	370
9	.....	.....	.....	710	260	168	100	65	118	322	276	300
10	.....	.....	.....	810	252	132	100	54	185	261	240	300
11	.....	.....	.....	810	236	810	98	50	124	209	224	280
12	.....	.....	202	680	220	2,010	86	46	108	189	224	300
13	.....	.....	300	620	213	2,440	81	39	76	157	500	292
14	.....	.....	445	1,440	206	1,810	84	46	74	146	345	292
15	.....	.....	650	1,710	199	1,100	84	39	61	137	322	395
16	.....	.....	740	1,020	192	810	74	44	78	134	322	620
17	.....	.....	500	775	185	680	86	34	76	143	296	740
18	.....	.....	445	650	206	530	100	38	74	292	680	560
19	.....	.....	370	560	213	345	84	38	69	880	845	420
20	.....	.....	345	1,020	182	345	68	38	61	680	650	322
21	.....	.....	395	880	154	300	74	41	57	650	500	345
22	.....	.....	950	740	143	280	72	31	59	950	445	500
23	.....	.....	590	1,260	136	280	57	44	67	1,260	420	710
24	.....	.....	620	810	129	252	174	28	61	880	370	880
25	.....	.....	650	680	132	213	202	63	67	680	530	810
26	.....	.....	810	530	122	192	143	112	69	560	445	1,020
27	.....	.....	1,350	445	115	206	98	59	65	472	395	950
28	.....	.....	2,010	395	98	244	89	77	74	395	345	880
29	500	.....	1,100	322	89	202	79	292	74	370	420	530
30	370	.....	1,260	345	100	185	61	420	219	345	395	345
31	300	.....	950	.....	109	.....	61	395	.....	300	.....	345

NOTE.—Daily discharge determined from a discharge rating curve well defined below 1,000 second-feet.

Monthly discharge of Mongaup River at Rio, N. Y., for 1911.

[Drainage area, 189 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	.....	.....	400	2.12	2.44	D.
February	.....	.....	150	.794	.83	D.
March	2,010	.....	516	2.73	3.15	B.
April	1,710	322	781	4.13	4.61	A.
May	420	89	212	1.12	1.29	A.
June	2,440	109	494	2.61	2.91	A.
July	202	57	105	.556	.64	A.
August	420	28	83.4	.441	.51	A.
September	251	57	101	.534	.60	A.
October	1,260	134	419	2.22	2.56	A.
November	845	224	378	2.00	2.23	A.
December	1,020	252	470	2.49	2.87	A.
The year	2,440	28	343	1.81	24.64	

NOTE.—Discharge Jan. 1 to Mar. 11, with the exception of Jan. 29 to Feb. 4, estimated from climatologic records and the discharge at Port Jervis.
Mean discharge Mar. 1–11 estimated 120 second-feet.

NEVERSINK RIVER AT GODEFFROY, N. Y.

Location.—At the suspension bridge half a mile east of the post office at Godeffroy, half a mile below the mouth of Brasher Kill (entering from the left), and 8 miles above the confluence of Neversink and Delaware rivers.

Records available.—August 4 to October 9, 1903; August 21 to December 25, 1909. Data also in the annual reports of the State engineer and surveyor of New York.

Drainage area.—314 square miles.

Gage.—Original, washed out by flood October 9, 1903. Second gage, an enameled staff, bolted to the downstream end of left-hand abutment; destroyed by flood, January 21, 1910. Present gage, established August 1, 1910, standard chain, supported by a cantilever arm fastened to the left-hand downstream cable tower; datum of present gage unchanged. Datum of new gage 0.98 foot lower than that of 1903 and the same as the one which it replaced.

Channel.—Bed of sand and gravel; liable to shift.

Artificial control.—There are several reservoirs in the upper part of the drainage area, two of which are now in use. The principal power plant is at Roses Point, near Cuddebackville, in the vicinity of the old Delaware & Hudson Canal. About half a mile above this point a concrete dam diverts water through the old feeder ditch to the plant. This power plant supplies Port Jervis, Middletown, and other small places in the vicinity, with electric light and power.

Accuracy.—Conditions are good for making measurements, but the channel is liable to shift from time to time, thus impairing the accuracy of the discharge rating curve. As the low-water flow is controlled absolutely by the power plant, determination of low-stage discharge is uncertain. Accurate computation of the diurnal fluctuation of discharge caused by the operation of the mills above the station has been rendered impossible by insufficient funds. It is proposed to install an automatic gage to determine the relation between the daily gage heights heretofore recorded and the true mean gage heights, thus making possible the publication of accurate computations of daily discharge from the inception of the station to date. The gage heights for 1911 are withheld pending this investigation, as no gage heights recorded at this station are true indices of the daily discharge.

Cooperation.—Maintained in cooperation with the New York State engineer and surveyor.

Discharge measurements of Neversink River at Godeffroy, N. Y., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
June 20	G. S. De Golyer	3.74	486
July 21[a]	do	2.76	49.2
21[a]	do	2.90	70.2
Oct. 11	C. C. Covert	3.77	507

[a] Measurement made by wading ¼ mile above bridge.

LEHIGH RIVER AT SOUTH BETHLEHEM, PA.

Location.—On the New Street Bridge connecting Bethlehem and South Bethlehem, Pa.

Records available.—September 22, 1902, to February 13, 1905; April 26, 1909, to December 31, 1911. Complete data 1902 to 1909 are published in Water Supply Paper 261.

Drainage area.—1,235 square miles.

Gage.—Chain and weight, similar to that employed when the station was first established; datum of the present gage 0.09 foot higher than that of the old one used prior to 1909. Elevation of the zero of the present gage 210.64 feet above sea level.

Channel.—Straight for one-third mile above and several hundred feet below the station. A low rubble dam crosses a portion of the channel a few hundred feet below the bridge. The construction of this dam caused an alteration in the 1902 rating curve and certain changes in the dam caused a further slight change in the rating curve between 1905 and 1909. The river bed consists of sand, gravel, and bowlders, and seems to be fairly permanent. Velocity good at low stages. Left bank low and overflows at high stages, right bank high and does not overflow.

Discharge measurements.—Made from the bridge.

Winter flow.—Relation between gage height and discharge at this station is little affected by ice.

Canal.—Lehigh Canal follows the left bank and passes over Monocacy Creek and under the left span of the bridge. The creek also passes under the bridge and enters the river a short distance below. An ice plant and gristmill take water from the canal and return it to the river above the bridge. The canal is measured at Main Street Bridge, one-third mile above the station, and the discharge, reduced by the amount of tailrace flow of ice plant and gristmill, is added to the river discharge. At high stages the river overflows into the canal and creek.

Accuracy.—Good.

Cooperation.—Since its reestablishment this station has been maintained by the Water Supply Commission of Pennsylvania, and many of the measurements have been made by students of Lehigh University, under the direction of the civil-engineering department.

The following discharge measurement was made by C. E. Ryder:
November 25, 1911: Gage height, 3.85 feet; discharge, 3,080 second-feet.

Daily gage height, in feet, of Lehigh River at South Bethlehem, Pa., for 1911.

[John E. Santee, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.11	2.88	3.07	3.73	3.42	3.55	2.53	2.17	6.88	2.78	3.40	3.52
2	3.62	2.92	3.04	3.61	3.85	3.32	2.46	2.17	5.29	5.87	3.26	3.41
3	5.59	2.60	2.96	3.43	3.31	3.03	2.46	2.16	4.39	4.66	3.13	3.27
4	6.21	2.91	2.84	3.39	3.22	2.84	2.42	2.75	3.94	4.01	3.06	3.39
5	4.84	3.62	2.64	4.02	3.15	2.71	2.45	2.49	3.51	3.71	3.03	3.21
6	4.31	2.85	2.70	4.27	3.00	2.76	2.37	2.42	3.72	3.40	2.98	3.23
7	4.07	2.63	2.64	4.21	2.93	2.97	2.29	2.30	3.78	3.69	3.81	3.19
8	3.78	2.88	2.46	4.11	2.89	2.78	2.54	2.71	3.53	3.36	3.37	3.14
9	3.72	3.80	2.63	4.05	2.82	2.63	2.27	2.45	3.37	3.27	3.18	3.07
10	3.34	2.73	2.79	4.11	2.80	2.53	2.32	2.27	3.67	3.16	3.13	2.97
11	3.26	2.61	2.21	3.98	2.78	2.44	2.33	2.15	3.43	3.22	3.02	3.08
12	3.34	2.52	2.90	3.92	2.74	4.11	3.28	2.10	3.88	3.29	2.88	3.05
13	3.52	3.09	3.07	3.78	2.67	5.88	2.16	2.02	3.46	3.14	3.42	3.01
14	4.17	2.95	2.97	3.84	2.61	6.65	2.17	2.18	3.27	2.98	3.37	2.98
15	4.83	2.71	3.19	4.37	2.62	5.42	2.50	2.05	3.19	2.90	3.29	3.05
16	4.35	2.53	3.51	3.99	2.56	4.68	2.22	2.10	3.20	2.99	3.24	3.52
17	3.74	2.71	2.81	3.96	2.55	4.49	3.06	2.05	3.06	2.89	3.16	4.27
18	3.57	3.11	3.31	3.82	2.56	3.97	3.24	2.15	2.97	4.12	3.87	3.85
19	3.42	3.40	3.07	3.69	2.53	3.52	2.62	2.00	2.87	4.98	4.58	3.67
20	3.40	2.90	3.12	4.75	2.71	3.36	2.42	1.92	2.78	4.48	4.33	3.49
21	3.36	2.63	3.25	4.89	2.52	3.16	2.49	2.03	2.70	4.29	4.04	3.39
22	3.26	2.54	3.14	4.80	2.49	3.04	2.59	1.85	2.82	4.84	3.77	3.51
23	3.13	2.62	3.21	4.77	2.43	3.28	2.44	1.90	2.65	5.57	3.61	3.99
24	2.96	2.53	3.29	4.48	2.42	3.07	2.66	1.90	2.64	5.40	3.72	4.16
25	2.74	2.61	3.07	4.17	2.32	3.03	2.91	2.22	2.56	4.85	3.82	4.02
26	2.92	3.23	3.14	3.94	2.36	3.03	2.62	2.45	2.45	4.40	3.50	3.94
27	2.88	3.33	3.60	3.80	2.41	3.02	2.49	2.39	2.49	4.18	3.50	4.11
28	3.09	3.48	4.92	3.65	2.22	2.88	2.39	2.43	2.40	3.98	3.44	3.95
29	3.36	.....	4.48	3.53	2.32	2.79	2.27	2.42	2.59	3.70	3.68	3.53
30	3.25	.....	4.31	3.44	2.33	2.67	2.19	5.74	3.11	3.62	3.56	3.51
31	3.04	.....	4.02	.....	2.50	.....	2.28	6.14	.....	3.47	.....	3.72

NOTE.—Gage heights probably not materially affected by ice.

Daily discharge, in second-feet, of Lehigh River at South Bethlehem, Pa., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,790	1,470	1,730	2,840	2,310	2,530	1,090	723	10,200	1,390	2,280	2,480
2	2,600	1,530	1,690	2,630	3,060	2,150	1,010	723	6,170	7,600	2,060	2,300
3	6,860	1,120	1,580	2,330	2,140	1,720	1,010	714	4,110	4,700	1,860	2,030
4	8,410	1,510	1,420	2,260	2,000	1,470	967	1,350	3,220	3,350	1,760	2,220
5	5,060	2,600	1,170	3,370	1,890	1,300	1,000	1,040	2,460	2,810	1,720	1,940
6	3,900	1,440	1,240	3,860	1,680	1,360	915	967	2,830	2,280	1,650	1,970
7	3,420	1,160	1,170	3,740	1,590	1,640	836	845	2,930	2,770	2,990	1,910
8	2,890	1,470	966	3,540	1,530	1,390	1,100	1,300	2,500	2,220	2,230	1,830
9	2,780	2,920	1,160	3,430	1,440	1,210	816	1,000	2,230	2,070	1,940	1,730
10	2,140	1,280	1,360	3,540	1,420	1,090	865	816	2,740	1,910	1,860	1,590
11	2,010	1,140	714	3,300	1,390	989	875	705	2,330	2,000	1,710	1,750
12	2,140	1,030	1,500	3,190	1,340	3,540	2,090	660	3,110	2,100	1,520	1,700
13	2,430	1,760	1,730	2,930	1,250	7,620	714	592	2,390	1,880	2,310	1,650
14	3,620	1,570	1,590	3,040	1,180	9,600	723	732	2,070	1,650	2,230	1,610
15	5,040	1,260	1,950	4,070	1,190	6,480	1,060	618	1,950	1,540	2,100	1,700
16	3,980	1,040	2,460	3,320	1,120	4,740	769	660	1,960	1,670	2,030	2,430
17	2,820	1,260	1,430	3,260	1,110	4,320	1,760	618	1,760	1,530	1,910	3,820
18	2,520	1,790	2,140	3,010	1,120	3,280	2,030	705	1,640	3,560	3,100	3,020
19	2,270	2,240	1,780	2,770	1,090	2,480	1,190	575	1,510	5,430	4,520	2,690
20	2,240	1,500	1,850	4,900	1,300	2,220	967	515	1,390	4,300	3,990	2,380
21	2,170	1,160	2,040	5,220	1,080	1,910	1,040	600	1,290	3,900	3,410	2,220
22	2,010	1,060	1,880	5,020	1,040	1,740	1,160	465	1,440	5,110	2,920	2,420
23	1,820	1,150	1,980	4,950	978	2,090	989	500	1,230	6,850	2,630	3,270
24	1,580	1,040	2,100	4,300	967	1,780	1,240	500	1,220	6,440	2,830	3,600
25	1,300	1,140	1,780	3,660	865	1,720	1,560	769	1,120	5,130	3,010	3,330
26	1,530	1,970	1,880	3,220	905	1,720	1,190	1,000	1,000	4,140	2,440	3,180
27	1,470	2,120	2,620	2,970	956	1,710	1,040	935	1,040	3,680	2,440	3,500
28	1,760	2,370	5,290	2,700	769	1,520	935	978	945	3,300	2,350	3,200
29	2,170	.....	4,300	2,500	865	1,400	816	967	1,160	2,790	2,760	2,450
30	2,000	.....	3,950	2,350	875	1,250	741	7,280	1,830	2,650	2,550	2,420
31	1,690	.....	3,370	.....	1,060	.....	826	8,280	.....	2,400	.....	2,780

NOTE.—Daily discharge determined from a fairly well defined discharge rating curve. Forty-five second-feet added to the daily discharge Mar. 15 to Dec. 2, when the canal was in operation.

Monthly discharge of Lehigh River at South Bethlehem, Pa., for 1911.

[Drainage area, 1,235 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area.)	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	8,410	1,300	2,850	2.31	2.66	A.
February	2,920	1,030	1,540	1.25	1.30	A.
March	5,290	714	1,990	1.61	1.86	A.
April	5,220	2,260	3,410	2.76	3.08	A.
May	3,060	769	1,340	1.09	1.26	A.
June	9,600	989	2,600	2.11	2.35	A.
July	2,090	714	1,070	.866	1.00	A.
August	8,280	465	1,230	.996	1.15	A.
September	10,200	945	2,390	1.94	2.16	A.
October	7,600	1,390	3,330	2.70	3.11	A.
November	4,520	1,520	2,440	1.98	2.21	A.
December	3,820	1,590	2,420	1.96	2.26	A.
The year	10,200	465	2,220	1.80	24.40	

TOHICKON CREEK AT POINT PLEASANT, PA.

Location.—About one-eighth mile above the mouth of the creek.
Records available.—1883 to 1911, except 1900.
Drainage area.—102 square miles.
Gage.—Automatic register.

Discharge measurements.—High stage determined from a curve developed from current meter measurements. The lower part of the rating curve has been developed from the computed discharge over a weir.

Accuracy.—Discharge rating curve well defined.

Cooperation.—Records obtained and furnished by the Philadelphia Bureau of Water, Department of Public Works, under the personal supervision of John E. Codman.

Daily discharge, in second-feet, of Tohickon Creek at Point Pleasant, Pa., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	163.0	104.0	118.0	87.5	37.2	37.7	8.2	22.5	1,823.0	33.7	41.0	89.0
2	873.5	74.0	90.3	68.4	63.4	46.3	7.4	14.5	317.5	1,592.0	38.1	64.5
3	2,036.5	61.8	69.9	49.9	66.8	39.3	8.7	16.6	109.5	508.5	30.8	59.3
4	1,149.8	691.4	61.2	87.0	53.3	28.1	10.6	21.6	58.0	131.0	30.8	65.8
5	300.5	544.6	56.4	716.0	48.7	26.0	6.6	18.4	40.6	73.8	33.8	78.5
6	153.0	115.4	55.6	564.0	39.6	53.7	6.6	8.7	40.6	55.5	44.7	75.6
7	119.0	113.3	52.3	247.5	30.6	70.5	11.0	6.8	32.4	177.5	999.5	75.6
8	98.0	97.5	61.8	127.0	30.6	49.0	10.5	8.2	24.8	115.0	338.5	79.0
9	78.5	72.5	104.6	242.0	32.3	41.5	6.0	7.6	26.8	76.0	133.5	114.5
10	135.5	67.6	355.0	300.5	32.3	28.8	6.9	7.3	18.8	50.8	83.0	114.5
11	91.5	75.6	398.5	163.5	26.8	18.7	8.6	6.7	186.9	55.0	68.9	99.0
12	65.2	102.5	214.5	100.0	26.8	35.9	6.7	5.1	108.0	64.3	76.9	82.7
13	114.2	151.0	187.5	79.7	25.2	483.5	5.7	5.1	36.9	55.6	131.5	78.5
14	310.0	157.5	164.0	84.7	15.5	483.5	6.7	7.3	30.7	41.6	138.0	70.1
15	485.5	109.0	1,847.5	137.7	20.9	166.0	47.3	11.0	39.8	35.8	367.5	783.7
16	274.5	87.0	979.0	144.5	28.7	81.9	23.4	19.7	51.5	33.8	485.5	1,218.0
17	173.5	87.5	356.5	89.5	25.0	49.4	170.1	80.9	52.9	32.2	241.5	792.5
18	209.0	78.5	160.5	66.1	22.3	37.1	641.0	72.7	39.2	1,127.9	2,479.5	302.5
19	114.2	104.7	154.5	69.0	18.1	27.6	101.3	7.7	32.6	1,270.0	1,339.2	169.0
20	61.5	109.0	271.0	1,624.0	14.5	20.3	35.9	4.9	28.8	535.5	264.5	109.0
21	67.7	109.0	280.0	680.5	9.7	19.7	87.5	4.1	22.3	1,009.0	159.0	87.0
22	65.5	114.0	152.5	242.5	11.3	17.7	321.0	6.3	23.4	775.0	117.0	200.0
23	64.3	92.0	101.0	266.0	17.2	15.2	80.0	5.6	21.1	1,079.5	84.0	1,201.0
24	83.8	82.7	75.0	196.0	13.4	18.3	365.5	8.2	10.3	518.0	821.0	515.0
25	94.3	104.5	54.0	113.0	8.3	53.4	127.5	39.8	15.6	194.0	720.0	206.0
26	60.3	131.0	52.1	77.9	10.7	55.1	50.8	19.8	22.3	122.0	250.0	148.5
27	163.5	131.0	449.5	62.4	9.3	21.7	31.4	16.6	18.8	95.0	145.0	658.5
28	407.5	131.0	704.0	54.7	3.9	16.3	24.5	25.8	13.3	73.4	137.5	371.5
29	224.0	.....	506.0	37.2	6.4	12.2	16.9	33.8	21.0	63.1	183.5	145.0
30	277.2	.....	404.0	23.1	33.6	9.5	11.8	57.7	31.0	56.2	153.5	138.0
31	200.5	.....	109.5	.....	47.4	.....	18.7	2,524.3	.....	47.6	.....	104.0

Monthly discharge of Tohickon Creek at Point Pleasant, Pa., for 1911.

[Drainage area, 102 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	2,040	60.3	281	2.75	3.17
February	691	61.8	139	1.36	1.42
March	1,850	52.1	279	2.74	3.16
April	1,620	23.1	227	2.23	2.49
May	66.8	3.9	26.8	.263	.30
June	484	9.5	68.8	.675	.75
July	641	5.7	73.1	.717	.83
August	2,520	4.1	99.8	.978	1.13
September	1,820	10.3	110	1.08	1.20
October	1,590	32.2	326	3.20	3.69
November	2,480	30.8	338	3.31	3.69
December	1,220	59.3	268	2.63	3.03
The year	2,520	3.9	187	1.83	24.86

NESHAMINY CREEK BELOW FORKS, PA.

Location.—A short distance below the junction of Big and Little Neshaminy creeks.
Records available.—1884 to 1911.
Drainage area.—139 square miles.
Gage.—Automatic register.
Discharge measurements.—Discharge at high stages determined from a curve developed from current meter measurements; lower part of rating curve developed from the computed discharge over a weir.
Accuracy.—Discharge rating curve well defined.
Cooperation.—Records obtained and furnished by Philadelphia Bureau of Water, Department of Public Works, under the personal supervision of John E. Codman.

Daily discharge, in second-feet, of Neshaminy Creek below Forks, Pa., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	461.0	174.0	194.0	103.5	150.0	91.5	14.2	12.2	1,469.8	122.5	121.0	213.0
2	996.0	120.0	158.5	95.0	422.0	64.5	12.5	11.7	349.5	1,493.8	100.0	189.5
3	2,153.0	135.0	129.5	87.5	140.0	37.5	14.2	11.7	201.0	332.0	89.5	183.0
4	1,731.0	1,157.0	117.0	113.5	100.5	33.5	14.0	41.7	151.5	173.0	94.5	175.5
5	436.0	462.0	117.0	517.0	92.0	33.5	12.0	48.0	116.5	131.5	92.5	166.0
6	436.0	181.7	158.5	601.5	83.5	69.5	11.7	20.0	101.0	113.0	371.5	163.0
7	264.0	313.6	173.0	239.0	75.0	85.5	10.7	15.0	94.5	132.5	1,027.5	160.0
8	188.0	246.0	133.5	166.5	71.5	52.0	10.3	13.5	84.0	132.5	255.5	158.0
9	168.0	156.9	132.5	238.0	68.0	34.0	10.7	12.2	76.5	106.5	161.0	156.0
10	165.5	134.5	130.5	364.5	64.0	30.0	10.5	11.2	76.5	91.0	139.5	141.0
11	191.0	144.5	140.5	186.5	59.0	33.0	8.4	11.5	297.0	109.0	131.5	128.5
12	165.5	233.5	164.0	146.5	51.5	43.0	8.4	12.7	253.0	121.5	173.5	130.0
13	295.0	303.0	165.0	126.0	49.0	61.0	11.7	12.7	104.5	101.5	351.5	126.0
14	314.0	272.5	167.0	141.5	45.0	68.0	11.2	12.0	77.0	80.0	173.5	116.5
15	381.5	201.0	1,662.4	229.8	40.0	48.0	9.0	248.0	146.0	73.5	693.5	450.0
16	313.5	186.5	601.5	175.5	42.5	31.0	9.7	286.0	212.0	81.0	563.0	1,017.5
17	135.0	139.5	285.0	135.5	41.5	29.0	16.5	58.5	166.5	79.5	242.0	634.0
18	135.0	253.0	279.5	111.5	35.0	30.0	93.3	21.2	111.5	617.0	2,981.3	319.5
19	135.0	279.5	237.5	126.0	33.5	30.0	42.5	15.2	87.0	431.8	566.5	235.5
20	134.0	185.5	254.0	1,537.0	32.5	25.0	22.0	15.5	80.5	342.0	325.0	182.0
21	124.0	182.5	225.0	536.5	31.0	20.5	22.7	14.7	64.0	873.3	298.0	166.0
22	115.0	192.5	170.0	392.5	29.0	20.5	17.0	14.7	47.0	602.7	207.0	241.5
23	105.5	152.5	151.0	364.0	28.0	22.5	11.7	11.2	51.0	987.2	176.0	970.5
24	96.0	129.0	144.0	280.0	24.8	22.5	13.7	8.7	51.0	419.5	1,087.0	361.5
25	96.0	246.5	142.0	215.0	23.2	19.0	15.7	71.0	49.0	276.0	666.5	240.5
26	96.0	471.0	129.5	169.0	26.5	19.0	16.5	91.5	49.0	225.0	328.0	224.5
27	220.7	438.5	163.0	141.5	25.8	22.0	15.5	88.5	43.0	193.0	248.5	779.6
28	438.5	258.0	345.0	129.0	20.3	22.0	13.5	107.0	37.5	168.5	312.7	307.5
29	291.0	.....	168.5	120.0	19.5	23.5	12.5	69.5	96.0	151.0	523.5	348.5
30	572.3	.....	154.0	111.0	17.0	20.5	12.0	111.0	181.0	139.5	276.0	293.2
31	238.7	.....	131.5	.....	59.0	.....	12.5	5,334.0	.....	130.0	.....	268.0

Monthly discharge of Neshaminy Creek below Forks, Pa., for 1911.

[Drainage area, 139 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	2,150	96.0	374	2.69	3.10
February	1,160	120	262	1.89	1.97
March	1,660	117	236	1.70	1.96
April	1,540	87.0	263	1.89	2.11
May	422	17.0	64.5	.464	.53
June	91.5	19.0	38.0	.273	.30
July	93.3	8.4	16.7	.120	.14
August	5,330	8.7	220	1.58	1.82
September	1,470	37.5	164	1.18	1.32
October	1,490	73.5	291	2.09	2.41
November	2,980	89.5	426	3.06	3.41
December	1,020	116	298	2.14	2.47
The year	5,330	8.4	221	1.59	21.54

SCHUYLKILL RIVER NEAR PHILADELPHIA, PA.

Location.—At Fairmount dam, near Philadelphia.

Records available.—1898 to 1911.

Drainage area.—1,920 square miles.

Discharge measurements.—Computed daily discharge represents the total flow of the river as determined from the amount wasted over the flashboards at Fairmount Dam, the pumpage from the river, the leakage, and the quantity used for power at Fairmount.

Diversions.—Except for a small amount of water drawn from the Delaware, the entire water supply for the city of Philadelphia is taken from the Schuylkill.

Cooperation.—Records obtained and furnished by the Philadelphia Bureau of Water, Department of Public Works, under the personal supervision of John E. Codman.

Daily discharge, in second-feet, of Schuylkill River near Philadelphia, Pa., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,630	1,069	1,181	2,419	1,685	1,617	556	290	23,238	1,547	1,761	2,885
2	3,437	764	953	2,255	1,955	1,507	284	290	8,200	6,787	2,046	2,622
3	8,679	617	864	1,610	2,242	1,189	228	290	4,342	9,660	2,115	2,425
4	11,157	1,651	769	1,610	1,617	760	417	721	2,726	6,378	1,761	2,592
5	5,062	2,462	831	3,860	1,301	772	592	823	2,143	4,303	1,528	2,592
6	3,259	1,530	891	4,189	1,358	1,038	390	832	2,201	3,954	2,274	2,105
7	2,636	967	891	1,971	1,005	1,382	526	714	1,394	2,163	4,242	2,105
8	2,404	779	891	1,875	976	1,044	1,899	651	1,319	2,028	3,470	2,105
9	2,404	900	769	1,947	976	867	2,044	566	1,188	1,870	2,392	2,105
10	1,803	845	665	2,222	976	347	858	566	1,188	1,547	1,753	1,901
11	1,558	687	1,221	2,222	857	347	727	454	1,924	1,403	1,670	1,818
12	1,344	687	1,353	1,791	758	1,190	601	454	2,000	1,547	1,670	1,666
13	1,140	920	1,154	1,628	674	4,447	601	197	1,653	1,547	1,930	1,504
14	1,636	1,170	1,020	1,235	773	5,507	221	373	1,123	1,274	2,270	1,512
15	2,810	1,737	4,435	1,963	773	3,997	399	401	1,191	1,148	2,637	2,457
16	3,138	1,185	2,985	2,520	462	2,709	876	887	1,656	1,148	3,606	4,263
17	1,970	1,088	1,613	2,030	486	2,007	2,239	457	1,726	1,149	2,642	6,663
18	1,327	1,700	1,154	1,411	486	1,540	6,702	567	1,256	4,750	9,212	3,852
19	913	2,126	1,154	1,362	486	1,320	2,735	432	1,113	8,470	8,602	3,537
20	1,039	2,751	1,154	4,515	486	1,023	1,323	738	1,014	4,538	6,162	3,032
21	1,039	2,329	1,154	6,421	770	1,023	1,088	738	558	4,327	4,457	3,032
22	1,039	1,527	1,154	4,678	468	636	1,018	373	782	4,580	4,260	3,888
23	903	1,127	901	4,678	397	636	796	198	782	6,642	3,051	5,148
24	903	901	610	3,785	365	636	861	373	558	8,337	5,502	4,751
25	671	901	665	2,820	365	310	1,515	373	558	6,087	6,553	4,023
26	537	1,540	665	2,490	365	636	824	346	558	4,538	3,822	3,748
27	625	1,809	908	2,025	365	636	648	1,046	558	5,079	3,266	4,158
28	1,336	1,680	2,775	1,812	365	984	291	1,765	550	2,971	3,147	4,906
29	1,384	.....	3,521	1,609	365	769	370	1,468	558	2,458	3,385	4,095
30	1,792	.....	3,026	1,533	294	769	291	3,865	1,394	2,509	3,385	3,252
31	1,407	.....	2,250	.....	486	.....	370	20,971	.....	2,094	.....	3,341

Monthly discharge of Schuylkill River near Philadelphia, Pa., for 1911.

[Drainage area, 1,920 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	11,200	537	2,290	1.19	1.37
February	2,750	617	1,340	.698	.73
March	4,440	610	1,410	.734	.85
April	6,420	1,240	2,550	1.33	1.48
May	2,240	294	804	.419	.48
June	5,510	310	1,390	.724	.81
July	6,700	221	1,040	.542	.62
August	21,000	197	1,360	.708	.82
September	23,200	550	2,320	.21	1.35
October	9,660	1,150	3,770	1.96	2.26
November	9,210	1,530	3,490	1.82	2.03
December	6,660	1,500	3,160	1.65	1.90
The year	23,200	197	2,080	1.08	14.70

PERKIOMEN CREEK NEAR FREDERICK, PA.

Location.—About 12 miles above the mouth of the creek and above the East Branch.

Records available.—1884 to 1911.

Drainage area.—152 square miles.

Gage.—Automatic register.

Discharge measurements.—Discharge at high stages determined from a curve developed from current-meter measurements; lower part of rating curve developed from the computed discharge over a weir.

Accuracy.—Discharge rating curve well defined.

Cooperation.—Records obtained and furnished by Philadelphia Bureau of Water, Department of Public Works, under the personal supervision of John E. Codman.

Daily discharge, in second-feet, of Perkiomen Creek near Frederick, Pa., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	209.0	164.0	171.0	128.0	126.0	305.5	47.8	49.0	1,066.0	121.0	120.0	179.0
2	1,105.0	120.0	142.0	112.5	240.0	159.5	40.1	53.7	313.0	1,075.6	109.5	156.0
3	1,743.5	107.5	133.0	111.5	163.0	111.0	41.8	46.6	175.0	224.5	99.5	159.0
4	882.0	587.2	125.0	131.0	121.0	93.0	35.3	49.6	122.5	185.0	90.0	185.0
5	302.0	473.2	126.0	763.5	107.0	75.0	37.2	53.2	96.5	143.0	78.0	154.5
6	209.0	176.3	132.0	501.0	93.0	518.5	39.6	46.7	90.0	111.0	106.0	139.5
7	173.0	173.0	131.0	281.0	87.0	263.0	38.6	43.2	83.5	133.0	848.5	139.0
8	148.0	157.0	127.0	209.0	84.5	155.0	149.0	41.2	76.0	142.0	273.5	146.0
9	161.5	141.5	135.0	202.5	82.0	101.5	52.3	42.2	71.0	106.0	163.0	141.0
10	132.0	141.5	376.0	365.5	79.5	76.5	39.2	43.7	75.5	90.0	139.0	135.0
11	119.5	141.5	425.5	225.0	81.0	55.9	35.1	42.7	150.2	106.0	134.0	140.0
12	109.0	167.5	232.0	167.0	80.5	344.1	35.1	39.6	114.7	128.0	144.0	132.0
13	269.0	209.0	217.5	139.0	71.5	1,071.7	29.3	35.5	83.5	108.5	318.5	116.0
14	393.0	230.0	202.0	202.5	58.5	633.0	24.6	39.1	64.0	83.0	176.0	107.5
15	476.0	200.0	1,294.3	473.5	58.5	255.0	42.6	38.6	100.0	72.0	418.5	465.7
16	259.0	160.0	695.2	259.0	65.0	160.0	49.8	36.6	147.0	79.5	497.0	936.2
17	178.0	148.5	262.0	187.0	60.8	115.0	1,168.8	37.5	127.0	82.0	258.5	626.7
18	139.5	382.2	254.5	152.0	53.7	98.0	447.5	46.1	98.5	2,050.8	2,129.0	323.5
19	111.0	373.6	219.0	172.0	51.3	99.0	139.0	71.3	78.5	771.3	646.7	233.5
20	102.5	202.0	358.0	1,552.2	48.3	88.5	99.5	64.3	64.5	404.5	354.0	135.0
21	93.0	167.0	310.5	702.5	45.8	67.5	112.5	40.6	49.2	490.5	270.0	165.0
22	101.5	148.5	206.0	335.0	46.4	59.0	128.0	40.1	49.2	586.5	230.0	236.5
23	111.0	145.0	164.5	354.5	46.4	55.3	79.9	39.2	78.5	1,195.0	196.5	1,026.3
24	106.0	129.5	136.5	307.5	43.7	56.4	86.9	35.6	51.7	467.0	781.5	435.5
25	95.0	180.0	113.0	227.5	43.7	49.5	118.0	54.3	38.5	300.0	757.9	278.0
26	89.0	346.5	105.0	186.0	45.8	51.3	92.0	75.0	40.6	236.0	296.5	241.5
27	104.5	414.0	317.0	164.0	45.8	54.9	60.3	84.5	38.0	189.0	238.0	730.7
28	314.0	265.0	495.7	149.0	42.2	55.5	48.9	98.5	33.6	166.0	230.0	358.5
29	220.0	.....	254.5	134.0	37.1	54.9	43.9	87.5	79.9	152.0	337.0	204.0
30	358.0	.....	201.0	122.0	36.0	52.5	40.2	136.0	124.0	139.0	235.5	204.0
31	186.5	.....	165.0	.....	93.3	.....	40.1	2,087.0	.....	128.0	.....	208.5

Monthly discharge of Perkiomen Creek near Frederick, Pa., for 1911.

[Drainage area, 152 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	1,740	89.0	290	1.91	2.20
February	587	108	223	1.47	1.53
March	1,290	105	265	1.74	2.01
April	1,550	112	301	1.98	2.21
May	240	36.0	75.4	.496	.57
June	1,070	49.5	178	1.17	1.30
July	1,170	24.6	111	.730	.84
August	2,090	35.5	119	.783	.90
September	1,070	33.6	126	.829	.92
October	2,050	72.0	331	2.18	2.51
November	2,130	78.0	356	2.34	2.61
December	1,030	108	285	1.88	2.17
The year	2,130	24.6	222	1.46	19.77

SUSQUEHANNA RIVER BASIN.

SUSQUEHANNA RIVER AT BINGHAMTON, N. Y.

Location.—At the Washington Street Bridge in Binghamton, about 800 feet above the mouth of Chenango River. No important tributaries between the station and the mouth of Unadilla Creek, about 50 miles upstream.

Records available.—July 31, 1901, to December 31, 1911. Data also in annual reports of State engineer and surveyor, State of New York.

Drainage area.—2,400 square miles.

Gage.—Standard chain fastened to upstream side of bridge, read twice daily: datum unchanged.

Channel.—Bed composed of rocks and gravel. Current swift but somewhat irregular. Channel at times clogged with grass and bars.

Discharge measurements.—Usually made at the Exchange Street Bridge, 1,900 feet above the Washington Street Bridge.

Artificial control.—2,800 feet upstream from the bridge is a timber crib dam affording 6 feet head; used for power development. There is no material control of the water by this dam.

Winter flow.—As a rule not greatly affected by ice.

Accuracy.—Discharge rating curve for low and medium stages is not well developed. The measurements plot erratically due to changes in conditions of flow. High-stage gage heights liable to considerable error because of backwater from ice jams which form near Willow Bend and also by backwater from Chenango River. Published data not very satisfactory.

Cooperation.—Established and maintained in cooperation with the State engineer and surveyor of New York.

Discharge measurements of Susquehanna River at Binghamton, N. Y., for 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 28	C. A. Cockroff	14.24	29,600
Apr. 21	C. S. De Golyer	4.59	6,670
June 14	.....do	6.14	10,700
16	.....do	4.33	5,920
Oct. 6[a]	.....do	2.33	1,074
7	.....do	2.49	1,580

[a] Measurements made by wading at Washington Street Bridge.

Daily gage height, in feet, of Susquehanna River at Binghamton, N. Y., for 1911.

[Hugh L. Smith and L. B. Farnsworth, observers.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.4	3.5	3.15	5.4	2.9	2.26	2.34	1.92	2.16	2.24	3.1	3.5
2	5.1	3.15	2.8	4.7	3.15	2.38	2.26	1.94	2.16	2.6	3.35	3.4
3	8.6	3.35	2.65	4.3	3.6	2.28	2.24	1.92	2.09	2.5	3.25	3.2
4	8.3	2.9	2.6	4.1	3.35	2.28	2.18	1.90	2.05	2.43	3.0	2.95
5	6.3	3.0	2.85	4.8	3.15	2.19	2.19	1.92	2.01	2.43	2.8	2.7
6	4.6	2.8	2.35	8.8	2.95	2.30	2.25	1.92	2.00	2.37	2.75	2.6
7	4.6	2.8	2.35	11.6	2.8	2.55	2.22	1.95	2.12	2.6	3.0	2.5
8	4.1	2.6	2.4	11.1	2.75	2.65	2.17	1.96	2.12	2.65	3.05	2.5
9	4.1	2.85	2.4	8.6	2.65	2.55	2.11	1.89	2.24	2.65	3.15	2.48
10	3.7	2.95	2.5	7.4	2.6	2.46	2.08	1.90	2.9	2.65	3.0	2.8
11	3.5	2.7	2.6	6.5	2.5	2.42	2.16	1.82	3.1	2.65	2.9	3.0
12	3.8	2.75	2.8	6.0	2.5	3.1	2.12	1.84	2.8	2.6	2.8	3.1
13	4.5	2.65	3.1	5.6	2.5	5.2	2.08	1.88	2.6	2.5	3.05	3.3
14	6.0	2.5	3.45	5.5	2.38	6.2	2.06	1.86	2.48	2.44	3.3	3.8
15	6.9	2.5	4.2	7.2	2.37	5.2	2.04	1.83	2.44	2.42	3.2	3.9
16	5.5	2.5	4.3	6.7	2.32	4.35	1.99	1.82	2.34	2.37	3.05	4.8
17	4.1	2.5	3.85	5.8	2.30	.....	2.06	1.80	2.28	2.32	3.05	5.3
18	3.6	2.5	3.45	5.0	2.31	.....	2.08	1.82	2.22	2.6	3.7	5.0
19	3.5	2.8	3.25	4.5	2.29	.....	2.05	1.83	2.22	3.45	4.8	4.6
20	3.4	3.0	3.0	4.6	2.24	.....	2.06	1.84	2.18	3.5	4.8	4.5
21	3.35	2.8	3.05	4.6	2.21	2.8	2.10	1.85	2.13	3.4	4.2	4.6
22	3.2	2.6	3.35	4.8	2.25	2.7	2.09	1.82	2.12	3.35	3.9	4.6
23	3.0	2.6	4.6	5.0	2.22	2.65	2.02	1.85	2.11	4.4	3.7	6.3
24	3.0	2.55	4.9	4.5	2.36	2.6	2.00	1.88	2.10	4.9	3.6	6.0
25	2.95	2.5	4.0	4.0	2.38	2.55	2.04	1.86	2.11	4.9	3.7	5.0
26	2.85	2.4	4.0	3.7	2.9	2.46	2.00	1.92	2.12	4.4	3.6	5.0
27	2.85	2.85	9.0	3.45	2.6	2.36	1.98	1.86	2.12	3.6	3.5	5.0
28	7.4	2.75	14.3	3.25	2.42	2.38	2.08	1.88	2.08	3.4	3.5	4.7
29	6.85	.....	11.7	3.1	2.34	2.40	1.96	1.97	2.10	3.05	3.8	4.0
30	5.5	.....	8.6	3.02	2.28	2.37	1.94	2.08	2.20	3.0	3.6	3.8
31	3.8	.....	7.0	.....	2.18	.....	1.91	2.09	.....	2.9	.....	3.8

NOTE.—Relation of gage height to discharge affected by backwater from anchor ice about Feb. 3 to Mar. 10. There was also doubtless some backwater during the remainder of January, February, and March. Gage heights were read to the water surface.

Daily discharge, in second-feet, of Susquehanna River at Binghamton, N. Y., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6,120	3,790	1,400	8,880	2,330	974	1,130	436	792	936	2,810	3,790
2	8,040	2,930	1,200	6,930	2,930	1,200	974	462	792	1,650	3,420	3,540
3	18,500	2,400	1,100	5,850	4,040	1,010	936	436	675	1,440	3,170	3,050
4	17,600	2,000	1,000	5,320	3,420	1,010	826	410	615	1,300	2,570	2,450
5	11,500	2,200	1,000	7,200	2,930	843	843	436	555	1,300	2,100	1,870
6	6,660	1,800	900	19,200	2,450	1,050	955	436	540	1,180	1,980	1,650
7	6,660	1,500	900	28,400	2,100	1,540	898	475	724	1,650	2,570	1,440
8	5,320	1,400	800	26,700	1,980	1,760	809	488	724	1,760	2,690	1,440
9	5,320	1,200	800	18,500	1,760	1,540	707	399	936	1,760	2,930	1,400
10	4,290	1,100	1,100	14,800	1,650	1,360	660	410	2,330	1,760	2,570	2,100
11	3,790	1,000	1,650	12,000	1,440	1,280	792	322	2,810	1,760	2,330	2,570
12	4,540	1,000	2,100	10,600	1,440	2,810	724	344	2,100	1,650	2,100	2,810
13	6,390	1,000	2,810	9,440	1,440	8,320	660	388	1,650	1,440	2,690	3,290
14	10,600	900	3,660	9,160	1,200	11,200	630	366	1,400	1,320	3,290	4,540
15	13,200	900	5,580	14,200	1,180	8,320	600	333	1,320	1,280	3,050	4,800
16	9,160	800	5,850	12,600	1,090	5,980	527	322	1,130	1,180	2,690	7,200
17	5,320	800	4,670	10,000	1,050	5,200	630	300	1,010	1,090	2,690	8,600
18	4,040	1,000	3,660	7,760	1,070	4,430	660	322	898	1,650	4,290	7,760
19	3,790	1,800	3,170	6,390	1,030	3,650	615	333	898	3,660	7,200	6,660
20	3,540	1,500	2,570	6,660	936	2,880	630	344	826	3,790	7,200	6,390
21	3,420	1,200	2,690	6,660	879	2,100	690	355	741	3,540	5,580	6,660
22	3,050	1,000	3,420	7,200	955	1,870	675	322	724	3,420	4,800	6,660
23	2,570	900	6,660	7,760	898	1,760	570	355	707	6,120	4,290	11,500
24	2,570	900	7,480	6,390	1,160	1,650	540	388	690	7,480	4,040	10,600
25	2,450	900	5,060	5,060	1,200	1,540	600	366	707	7,480	4,290	7,760
26	2,220	1,000	5,060	4,290	2,330	1,360	540	436	724	6,120	4,040	7,760
27	2,220	1,800	19,800	3,660	1,650	1,160	514	366	724	4,040	3,790	7,760
28	14,800	1,600	38,100	3,170	1,280	1,200	660	388	660	3,540	3,790	6,930
29	13,100	.....	28,800	2,810	1,130	1,240	488	501	690	2,690	4,540	5,060
30	9,160	.....	18,500	2,620	1,010	1,180	462	660	860	2,570	4,040	4,540
31	4,540	.....	13,600	.....	826	.....	423	675	.....	2,330	.....	4,540

NOTE.—Daily discharge determined from a fairly well defined discharged rating curve. Daily discharge Feb. 3 to Mar. 10 estimated from climatologic records and the discharge from adjacent drainage areas. Discharge June 17 to 20 interpolated.

Monthly discharge of Susquehanna River at Binghamton, N. Y., for 1911.

[Drainage area, 2,400 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	18,500	2,220	6,920	2.88	3.32	C.
February	3,790	800	1,440	.600	.62	C.
March	38,100	800	6,290	2.62	3.02	C.
April	28,400	2,620	9,670	4.03	4.50	B.
May	4,040	826	1,640	.683	.79	C.
June	11,200	843	2,710	1.13	1.26	C.
July	1,130	423	689	.287	.33	C.
August	675	300	406	.169	.19	C.
September	2,810	540	998	.416	.46	C.
October	7,480	936	2,670	1.11	1.28	C.
November	7,200	1,980	3,580	1.49	1.66	B.
December	11,500	1,400	5,070	2.11	2.43	B.
The year	38,100	300	3,520	1.47	19.86	

SUSQUEHANNA RIVER AT WILKES-BARRE, PA.

Location.—At the Market Street Bridge, Wilkes-Barre.

Records available.—March 30, 1899, to December 31, 1911, United States Geological Survey; 1888 to 1911, by the United States Weather Bureau (gage heights only).

Drainage area.—9,810 square miles.

Gage.—The Weather Bureau gage, on which readings were begun in 1888, was on the left pier of the bridge. The chain gage established by the United States Geological Survey in 1899 was fastened to the bridge and its datum was made 4 feet lower than the datum of the Weather Bureau gage to avoid negative readings. This datum was soon after adopted by the Weather Bureau. On July 20, 1910, the Weather Bureau installed a Mott type gage in the same position and at the same datum as the chain gage. The datum adopted by the United States Geological Survey gage has remained constant. Records obtained by the Weather Bureau prior to the adoption of the Geological Survey gage datum should have 4 feet added to reduce them to the present datum.

Channel.—The station is situated in a deep pool with steep high banks which seldom overflow.

Discharge measurements.—Made from the bridge.

Winter flow.—Relation between gage height and discharge at this station affected by ice during the winter. Water is often backed up many feet by ice gorges.

Accuracy.—Conditions of flow subject to change at irregular intervals. A fairly good discharge rating curve has been developed.

Cooperation.—Discharge measurements at this station are made by the Water Supply Commission of Pennsylvania.

Daily gage height, in feet, of Susquehanna River at Wilkes-Barre, Pa., for 1911.

[Obadiah Hemstreet, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.4	8.0	8.5	11.8	5.65	3.45	3.25	2.45	4.15	3.45	4.94	6.14
2	10.8	6.4	6.9	9.9	5.70	3.20	3.15	2.45	3.75	4.05	4.84	6.14
3	9.0	5.9	6.2	8.6	5.75	3.15	3.15	2.45	3.45	5.35	4.84	5.64
4	14.0	6.4	5.5	7.8	6.60	3.50	3.05	2.35	3.15	5.25	4.94	5.24
5	12.0	6.2	4.9	7.6	6.25	3.45	2.90	2.30	2.95	5.05	4.94	5.04
6	10.0	8.0	4.8	9.5	5.75	3.35	2.75	2.25	2.95	4.55	4.74	4.84
7	8.1	8.9	4.5	13.6	5.30	3.30	2.75	2.35	3.55	4.55	4.74	4.54
8	6.8	7.7	4.2	16.4	5.05	3.25	2.95	2.25	3.35	4.55	4.94	4.44
9	7.0	7.5	4.3	16.1	4.80	4.40	2.85	2.25	3.05	4.95	5.14	4.44
10	6.8	7.3	4.2	13.9	4.55	4.15	2.80	2.30	5.35	5.15	5.14	4.34
11	6.1	6.8	4.9	12.9	4.45	3.95	2.75	2.25	4.65	4.85	5.04	4.54
12	5.8	6.3	6.9	11.3	4.40	5.00	2.75	2.15	5.35	4.85	4.84	5.04
13	6.3	5.7	7.6	10.2	4.15	4.75	2.65	2.15	5.05	4.95	4.94	5.24
14	8.5	4.8	8.7	9.5	4.00	8.10	2.65	2.15	4.55	4.85	4.94	5.34
15	12.0	4.2	9.2	10.0	3.85	9.35	2.70	2.20	4.15	4.55	5.34	7.84
16	13.2	3.6	10.1	11.1	3.75	8.45	2.65	2.15	4.05	4.35	5.34	7.44
17	10.5	3.9	8.7	10.9	3.70	7.30	2.65	2.05	3.75	4.05	5.14	9.04
18	8.8	4.2	7.5	9.7	3.65	6.25	2.55	2.05	3.45	4.15	5.24	9.34
19	6.8	4.6	7.0	8.7	3.60	5.90	2.65	2.05	3.45	6.35	5.54	9.04
20	6.2	7.5	6.4	8.3	3.55	5.35	2.80	2.30	3.25	6.35	6.04	8.04
21	6.0	10.0	6.1	9.9	3.55	4.85	2.85	2.25	3.15	6.95	7.44	7.14
22	5.8	10.4	6.3	10.2	3.90	4.50	2.85	2.25	3.05	6.85	6.84	6.44
23	5.1	9.9	7.3	10.3	3.65	4.15	2.75	2.25	3.05	6.95	6.24	6.34
24	5.1	9.0	8.9	10.4	3.50	4.10	2.75	2.15	2.95	7.85	5.84	8.24
25	5.2	8.6	8.3	9.3	3.55	3.95	2.70	2.20	2.75	7.95	5.64	10.04
26	5.4	8.8	7.6	8.3	3.45	3.65	2.45	2.45	2.75	6.75	5.54	9.44
27	5.0	8.8	7.8	7.6	4.90	3.60	2.45	2.45	2.75	5.95	5.54	8.44
28	5.0	10.7	13.7	6.0	4.55	3.55	2.55	2.45	2.75	5.55	5.44	8.04
29	9.9	.....	19.2	6.0	4.10	3.50	2.55	3.15	2.95	5.45	5.54	7.64
30	10.9	.....	17.2	5.4	3.75	3.35	2.50	3.90	3.45	5.35	5.54	6.44
31	9.0	.....	14.2	.....	3.50	.....	2.45	3.55	.....	5.15	.....	6.14

NOTE—Gage heights probably not materially affected by backwater from ice Jan. 1 to Feb. 3; ice was moving freely Jan. 1. Backwater from ice occurred Feb. 4–13, and Feb. 20–28. There may have been slight backwater from ice the first part of March. No ice in December.

Daily discharge, in second-feet, of Susquehanna River at Wilkes-Barre, Pa., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	16,900	19,600	21,900	39,000	9,900	3,160	2,710	1,290	4,930	3,160	7,400	11,700
2	33,500	12,800	14,800	28,800	10,100	2,600	2,500	1,290	3,860	4,660	7,060	11,700
3	24,400	10,800	12,000	22,400	10,300	2,500	2,500	1,290	3,160	8,820	7,060	9,870
4	52,200	9,010	9,360	18,700	13,600	3,270	2,290	1,160	2,500	8,480	7,400	8,440
5	40,000	7,650	7,260	17,800	12,200	3,160	2,000	1,090	2,100	7,780	7,400	7,740
6	29,400	7,260	6,930	26,800	10,300	2,930	1,740	1,030	2,100	6,120	6,730	7,060
7	20,100	6,700	5,970	49,700	8,650	2,820	1,740	1,160	3,380	6,120	6,730	6,090
8	14,400	6,140	5,070	68,400	7,780	2,710	2,100	1,030	2,930	6,120	7,400	5,780
9	15,200	4,500	5,360	66,200	6,930	5,660	1,910	1,030	2,290	7,430	8,090	5,780
10	14,400	5,260	5,070	51,600	6,120	4,930	1,820	1,090	8,820	8,120	8,090	5,480
11	11,600	5,600	7,260	45,500	5,820	4,380	1,740	1,030	6,440	7,100	7,740	6,090
12	10,500	5,780	14,800	36,200	5,660	7,600	1,740	915	8,820	7,100	7,060	7,740
13	12,400	6,210	17,800	30,400	4,930	6,760	1,580	915	7,780	7,430	7,400	8,440
14	21,900	6,930	22,900	26,800	4,520	20,100	1,580	915	6,120	7,100	7,400	8,790
15	40,200	5,070	25,300	29,400	4,120	26,100	1,660	970	4,930	6,120	8,790	18,900
16	47,200	3,500	29,900	35,100	3,860	21,700	1,580	915	4,660	5,510	8,790	17,100
17	31,900	4,250	22,900	34,100	3,740	16,500	1,580	810	3,860	4,660	8,090	24,500
18	23,400	5,070	17,400	27,800	3,620	12,200	1,440	810	3,160	4,930	8,440	26,000
19	14,400	6,280	15,200	22,900	3,500	10,800	1,580	810	3,160	12,600	9,500	24,500
20	12,000	7,960	12,800	21,000	3,380	8,820	1,820	1,090	2,710	12,600	11,400	19,800

Daily discharge, in second-feet, of Susquehanna River at Wilkes-Barre, Pa., for 1911—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
21	11,200	9,430	11,600	28,800	3,380	7,100	1,910	1,030	2,500	15,000	17,100	15,800
22	10,500	8,430	12,400	30,400	4,250	5,970	1,910	1,030	2,290	14,600	14,500	12,900
23	7,950	7,070	16,500	30,900	3,620	4,930	1,740	1,030	2,290	15,000	12,100	12,500
24	7,950	6,960	23,900	31,400	3,270	4,790	1,740	915	2,100	18,900	10,600	20,700
25	8,300	6,430	21,000	25,800	3,380	4,380	1,660	970	1,740	19,400	9,870	29,600
26	9,000	6,700	17,800	21,000	3,160	3,620	1,290	1,290	1,740	14,200	9,500	26,500
27	7,600	7,960	18,700	17,800	7,260	3,500	1,290	1,290	1,740	11,000	9,500	21,600
28	7,600	13,000	50,300	11,200	6,120	3,380	1,440	1,290	1,740	9,540	9,140	19,800
29	28,800	.....	90,300	11,200	4,790	3,270	1,440	2,500	2,100	9,180	9,500	18,000
30	34,100	.....	74,300	9,000	3,860	2,430	1,360	4,250	3,160	8,820	9,500	12,900
31	24,400	.....	53,500	.....	3,270	.....	1,290	3,380	.....	8,120	.....	11,700

NOTE.—Discharge determined from a well-defined curve. No correction made in the discharge for January or March for possible effect of ice. Discharge Feb. 4–13 and 20–28 taken as 85 per cent of the discharge at Danville. Discharge for remainder of February considered unaffected by ice.

Monthly discharge of North Branch of Susquehanna River at Wilkes-Barre, Pa., for 1911.

[Drainage area, 9,810 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	52,200	7,600	20,800	2.12	2.44	A.
February	19,600	3,500	7,580	.773	.80	C.
March	90,300	5,070	21,600	2.20	2.54	A.
April	68,400	9,000	30,500	3.11	3.47	A.
May	13,600	3,160	5,980	.610	.70	A.
June	26,100	2,500	7,090	.723	.81	A.
July	2,710	1,290	1,760	.179	.21	A.
August	4,250	810	1,280	.130	.15	A.
September	8,820	1,740	3,640	.371	.41	A.
October	19,400	3,160	9,220	.940	1.08	A.
November	17,100	6,730	8,980	.915	1.02	A.
December	29,600	5,480	14,300	1.46	1.68	A.
The year	90,300	810	11,100	1.13	15.31	

SUSQUEHANNA RIVER AT DANVILLE, PA.

Location.—At the Mill Street Bridge in Danville, 52 miles below Wilkes-Barre and 11 miles above the mouth of the West Branch of the Susquehanna. No important tributaries enter the Susquehanna within several miles of the station.

Records available.—March 25, 1899, to December 31, 1911.

Drainage area.—11,100 square miles.

Gage.—Chain attached to the bridge March 24, 1905. On March 9, 1904, the bridge to which the gage was attached was carried away by an ice freshet and from that date until the spring of 1905, when the new steel bridge was completed, observations were made from temporary gages and were constantly liable to error for stages less than 5 feet. Except during this period, the datum of the chain gage has remained constant.

Channel.—Permanent.

Canal.—The Susquehanna at this point is paralleled on the north side by the Pennsylvania Canal.

Discharge measurements.—Made from the bridge. No measurement made since 1909.

Winter flow.—Considerably affected by ice.

Accuracy.—An excellent discharge rating curve has been developed.

Cooperation.—Established by United States Geological Survey; now maintained by Water Supply Commission of Pennsylvania, which furnishes the table of daily gage heights.

Daily gage height, in feet, of Susquehanna River at Danville, Pa., for 1911.

[E. F. Bell, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	8.12	6.95	6.80	9.95	5.35	3.22	2.92	2.26	4.65	3.00	4.49	4.72
2	6.22	5.80	6.15	8.20	4.98	3.15	2.87	2.20	4.20	3.98	4.27	5.25
3	7.90	5.00	5.30	7.10	4.78	3.12	2.82	2.46	3.75	4.82	4.35	5.00
4	12.38	4.55	4.92	6.50	5.15	3.00	2.78	2.32	3.28	4.60	4.51	4.68
5	11.45	4.20	4.40	6.44	5.34	3.05	2.72	2.18	3.12	4.70	4.46	4.40
6	9.75	4.10	4.32	6.95	5.00	3.15	2.63	2.13	3.16	4.30	4.24	4.28
7	7.75	3.95	4.12	9.70	4.72	3.08	2.59	2.12	3.40	4.05	4.18	4.10
8	7.10	3.80	3.88	12.48	4.45	3.01	2.52	2.12	3.40	4.08	4.30	4.02
9	6.65	3.32	3.60	13.40	4.18	3.25	2.51	2.10	3.30	4.05	4.38	3.88
10	6.15	3.55	3.50	11.55	4.04	3.69	2.54	2.08	3.88	4.52	4.46	3.88
11	5.62	3.65	4.08	10.35	3.94	3.45	2.52	2.01	4.78	4.38	4.48	3.90
12	5.42	3.70	4.50	9.35	3.80	3.85	2.46	1.94	4.52	4.26	4.40	3.98
13	5.50	3.82	5.90	8.45	3.65	4.50	2.46	2.00	4.72	4.22	4.42	4.38
14	6.75	3.85	6.65	7.88	3.53	5.72	2.42	2.02	4.30	4.22	4.44	4.55
15	9.65	3.55	7.45	8.10	3.45	7.52	2.48	2.00	3.98	4.18	4.45	5.10
16	10.80	3.42	8.10	8.60	3.44	7.32	2.40	2.02	3.78	3.92	4.60	6.47
17	9.65	3.33	7.70	9.05	3.30	6.35	2.42	1.97	3.37	3.80	4.61	7.31
18	7.50	3.68	6.70	8.22	3.26	5.70	2.48	1.93	3.22	4.07	4.60	7.83
19	6.60	4.10	6.00	7.53	3.25	5.02	2.41	1.88	3.12	5.28	4.80	7.75
20	5.65	4.28	5.60	7.62	3.29	4.67	2.40	1.90	3.05	5.68	5.40	6.65
21	5.32	4.65	5.27	8.35	3.30	4.28	2.44	1.92	2.98	6.00	6.00	6.10
22	5.15	4.40	5.20	8.74	3.25	4.00	2.51	2.00	2.82	6.14	6.25	6.35
23	4.90	4.05	5.65	8.70	3.32	3.74	2.55	2.00	2.86	6.62	5.60	6.70
24	4.48	4.02	6.55	8.74	3.18	3.56	2.50	1.94	2.75	7.23	5.30	6.75
25	4.24	3.88	7.00	8.32	3.10	3.50	2.47	1.94	2.70	7.02	5.15	8.10
26	4.14	3.95	6.50	7.30	3.08	3.41	2.40	2.25	2.68	6.85	4.95	8.05
27	4.02	4.28	6.48	6.64	3.46	3.28	2.32	2.42	2.64	6.26	4.82	7.65
28	4.43	5.50	9.55	6.00	4.00	3.14	2.28	2.35	2.64	5.63	4.75	7.10
29	5.64	.....	14.75	5.60	3.60	3.11	2.25	3.70	2.72	5.17	4.60	6.55
30	9.20	.....	14.20	5.30	3.42	2.99	2.24	4.62	2.95	4.88	4.62	6.17
31	8.15	.....	12.25	.....	3.22	.....	2.25	4.34	.....	4.66	.....	5.40

NOTE.—Probably considerable backwater from ice from about Jan. 1 to 9, but none for remainder of January. Slight backwater at times during February and the first part of March. No ice during December.

Daily discharge, in second-feet, of Susquehanna River at Danville, Pa., for 1911.

[E. F. Bell, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	18,000	23,400	22,500	45,500	14,600	4,920	3,850	1,970	11,100	4,120	10,300	11,400
2	19,200	16,900	18,800	31,500	12,700	4,660	3,680	1,830	9,000	8,010	9,320	14,100
3	29,400	12,800	14,300	24,300	11,700	4,550	3,520	2,460	7,010	11,900	9,690	12,800
4	60,000	10,600	12,400	20,800	13,600	4,120	3,400	2,110	5,140	10,900	10,400	11,200
5	45,000	9,000	9,920	20,400	14,500	4,300	3,200	1,790	4,550	11,300	10,200	9,920
6	35,000	8,550	9,550	23,400	12,800	4,660	2,930	1,680	4,700	9,460	9,180	9,370
7	25,000	7,880	8,640	43,300	11,400	4,410	2,810	1,660	5,600	8,320	8,910	8,550
8	18,000	7,220	7,570	69,100	10,200	4,160	2,620	1,660	5,600	8,460	9,460	8,190
9	18,000	5,300	6,400	78,600	8,910	5,030	2,590	1,620	5,220	8,320	9,830	7,570
10	18,800	6,200	6,000	60,000	8,280	6,760	2,670	1,580	7,570	10,500	10,200	7,570
11	16,000	6,600	8,460	49,000	7,840	5,800	2,620	1,440	11,700	9,830	10,300	7,660
12	14,900	6,800	10,400	40,400	7,220	7,440	2,460	1,310	10,500	9,280	9,920	8,010
13	15,300	7,310	17,500	33,300	6,600	10,400	2,460	1,420	11,400	9,090	10,000	9,830
14	22,200	7,440	21,600	29,300	6,120	16,500	2,350	1,460	9,460	9,090	10,100	10,600
15	42,900	6,200	26,500	30,800	5,800	26,900	2,510	1,420	8,010	8,910	10,200	13,300

Daily discharge, in second-feet, of Susquehanna River at Danville, Pa., for 1911—Contd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16	53,000	5,680	30,800	34,400	5,760	25,700	2,300	1,460	7,140	7,750	10,900	20,600
17	42,900	5,330	28,100	37,900	5,220	19,900	2,350	1,370	5,490	7,220	10,900	25,600
18	26,800	6,720	21,900	31,600	5,070	16,400	2,510	1,290	4,920	8,420	10,900	29,000
19	21,300	8,550	18,000	27,000	5,030	12,900	2,330	1,210	4,550	14,200	11,800	28,400
20	16,100	9,370	15,900	27,600	5,180	11,200	2,300	1,240	4,300	16,300	14,800	21,600
21	14,400	11,100	14,200	32,500	5,220	9,370	2,400	1,280	4,050	18,000	18,000	18,500
22	13,600	9,920	13,800	35,400	5,030	8,100	2,590	1,420	3,520	18,800	19,400	19,900
23	12,300	8,320	16,100	35,100	5,300	6,970	2,700	1,420	3,650	21,500	15,900	21,900
24	10,300	8,190	21,100	35,400	4,770	6,240	2,560	1,310	3,300	25,100	14,300	22,200
25	9,180	7,570	23,700	32,300	4,480	6,000	2,480	1,310	3,140	23,800	13,600	30,800
26	8,730	7,880	20,800	25,600	4,410	5,640	2,300	1,940	3,080	22,800	12,600	30,400
27	8,190	9,370	20,700	21,600	5,840	5,140	2,110	2,350	2,960	19,400	11,900	27,800
28	10,100	15,300	42,000	18,000	8,100	4,620	2,010	2,180	2,960	16,000	11,600	24,300
29	16,100	.....	93,500	15,900	6,400	4,520	1,940	6,800	3,200	13,600	10,900	21,100
30	39,100	.....	87,300	14,300	5,680	4,090	1,920	11,000	3,950	12,200	11,000	18,900
31	31,100	.....	66,800	.....	4,920	.....	1,940	9,640	.....	11,100	.....	14,800

NOTE.—Discharge determined from a well-defined rating curve. Discharge reduced account of probable backwater from ice Jan. 1 and 4 to 9. The remainder of January, February, and March not corrected for possible effect of ice.

Monthly discharge of Susquehanna River at Danville, Pa., for 1911.

[Drainage area, 11,100 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	[a] 60,000	8,190	23,600	2.13	2.46	B.
February	23,400	5,300	9,120	.822	.86	B.
March	93,500	6,000	23,700	2.14	2.47	A.
April	78,600	14,300	34,100	3.07	3.42	A.
May	14,600	4,410	7,700	.694	.80	B.
June	26,900	4,090	8,710	.785	.88	B.
July	3,850	1,920	2,590	.233	.27	B.
August	11,000	1,210	2,340	.211	.24	B.
September	11,700	2,960	5,890	.531	.59	B.
October	25,100	4,120	12,700	1.14	1.31	A.
November	19,400	8,910	11,600	1.05	1.17	A.
December	30,800	7,570	17,000	1.53	1.76	A.
The year	93,500	1,210	13,300	1.20	16.23	

[a] Estimated on account of ice.

SUSQUEHANNA RIVER AT HARRISBURG, PA.

Location.—At the Walnut Street Bridge at Harrisburg, 2 miles below the mouth of Conodoguinet Creek and 1½ miles above the mouth of Paxton Creek.

Records available.—1890 to December 31, 1911.

Drainage area.—24,000 square miles.

Gage.—The original gage established in 1890 by E. Mather, president of the Harrisburg water board, is located in the pump well at the pump house of the city waterworks, the well being connected with the river by two large mains. On July 18, 1904, a chain gage was installed on the Walnut Street Bridge. The datums of both gages have remained constant since their establishment.[1]

Channel.—Fairly permanent. The river is divided into two channels by Foster Island which is overflowed at flood stages.

[1] For full information regarding the two gages and changes in conditions of flow, see Water-Supply Papers U. S. Geol. Survey Nos. 109 and 167.

Discharge measurements.—Made from the bridge. No measurement has been made since 1908.

Winter flow.—Relation between gage height and discharge affected by ice.

Accuracy.—Conditions of flow relatively permanent; a good discharge rating curve has been developed.

Cooperation.—Since July 15, 1906, gage readings have been furnished by the United States Weather Bureau.

Daily gage height, in feet, of Susquehanna River at Harrisburg, Pa., for 1911.

[E. R. Denman, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.18	5.45	4.13	7.12	4.02	1.87	1.65	0.62	5.66	2.58	3.23	3.18
2	3.94	4.93	4.47	6.02	3.82	1.80	1.55	.61	4.88	4.28	3.06	3.15
3	4.58	4.10	3.82	5.26	3.78	1.79	1.40	.88	3.93	6.68	2.97	3.33
4	6.64	3.80	3.69	4.72	3.66	1.77	1.32	1.42	3.12	7.68	2.87	3.24
5	8.29	3.38	3.35	4.61	3.65	1.78	1.22	1.38	2.62	5.71	2.86	3.08
6	6.64	3.21	3.09	5.02	3.57	1.76	1.13	1.05	2.32	4.91	2.80	2.94
7	5.52	2.70	2.86	5.87	3.34	1.81	1.09	.99	2.33	4.38	2.90	2.78
8	4.84	2.68	2.69	7.97	3.09	1.82	1.09	1.10	2.64	4.14	3.08	2.65
9	4.02	2.60	2.55	8.96	2.92	1.78	1.03	1.00	2.79	4.50	3.29	2.56
10	3.73	2.51	2.44	8.35	2.76	1.87	.94	.90	3.81	4.41	3.27	2.51
11	3.80	2.38	2.61	7.33	2.64	2.04	.93	.78	6.25	4.21	3.30	2.54
12	3.47	2.40	2.93	6.75	2.58	2.00	.91	.69	5.39	3.89	3.22	2.58
13	3.38	2.51	3.44	6.07	2.46	2.04	.89	.61	4.41	3.62	3.10	2.68
14	4.32	2.59	4.06	5.62	2.37	2.59	.87	.57	3.88	3.41	3.28	2.84
15	7.08	2.91	4.41	5.47	2.24	3.83	.82	.57	3.58	3.26	3.34	3.19
16	11.27	3.05	4.64	6.05	2.14	4.38	.93	.52	4.32	3.09	3.26	4.18
17	8.98	3.05	4.89	6.43	2.10	4.01	1.03	.60	4.90	2.88	3.39	5.74
18	6.86	3.29	4.61	6.21	2.04	3.52	.99	.61	5.34	3.30	3.38	6.85
19	5.49	3.88	4.20	5.59	1.99	3.04	1.07	.59	4.33	4.42	3.59	6.72
20	4.79	4.33	3.88	5.37	1.99	2.71	1.02	.49	3.58	4.75	4.20	6.09
21	4.31	4.30	3.76	6.48	1.94	2.46	.94	.45	3.15	4.75	4.41	5.38
22	3.93	4.06	3.69	7.27	2.04	2.26	.87	.52	2.87	4.58	4.62	4.84
23	3.60	3.61	3.62	7.52	1.97	2.09	.88	.52	2.58	4.65	4.44	4.65
24	3.42	3.37	3.78	7.39	2.11	1.97	.95	.52	2.42	5.38	4.07	5.04
25	3.09	3.15	4.29	7.11	2.05	1.89	.93	.67	2.26	5.35	3.81	5.40
26	2.88	3.14	4.41	6.40	1.92	1.79	.90	.88	2.13	4.90	3.70	5.69
27	2.72	3.23	4.24	5.68	1.90	1.74	.85	1.14	2.06	4.62	3.52	5.60
28	2.62	3.44	5.27	5.11	1.94	1.76	.82	1.22	1.91	4.22	3.41	5.52
29	3.04	.....	9.35	4.64	2.16	1.66	.72	1.93	1.94	3.86	3.31	5.32
30	5.16	.....	9.76	4.32	2.02	1.72	.71	3.88	2.27	3.58	3.22	5.02
31	5.99	.....	8.40	.....	1.97	.....	.69	5.30	.....	3.33	.....	4.78

NOTE.—River frozen Jan. 1 and Jan. 2 until 6 p. m., when the ice broke, there probably being no further material backwater from ice during the remainder of the winter. No ice in December.

Daily discharge, in second-feet, of Susquehanna River at Harrisburg, Pa., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	15,000	59,200	38,200	88,900	36,700	12,100	10,400	4,470	62,700	18,600	26,000	25,400
2	32,000	50,700	43,300	68,800	33,900	11,600	9,740	4,420	49,900	40,400	24,000	25,000
3	45,100	37,800	33,900	56,100	33,300	11,500	8,740	5,720	35,400	80,700	22,900	27,300
4	79,900	33,600	32,100	47,300	31,600	11,300	8,230	8,870	24,700	99,500	21,800	26,100
5	111,000	27,900	27,500	45,600	31,500	11,400	7,610	8,610	19,000	63,500	21,700	24,200
6	79,900	25,800	24,300	52,100	30,400	11,300	7,080	6,640	16,000	50,400	21,000	22,600
7	60,400	19,900	21,700	66,200	27,400	11,600	6,860	6,310	16,100	41,900	22,100	20,800
8	49,200	19,700	19,800	105,000	24,300	11,700	6,860	6,910	19,200	38,400	24,200	19,300
9	36,700	18,800	18,300	124,000	22,400	11,400	6,520	6,360	20,900	43,800	26,800	18,400
10	32,600	17,900	17,200	112,000	20,500	12,100	6,040	5,820	33,700	42,400	26,500	17,900
11	33,600	16,600	18,900	92,900	19,200	13,500	5,980	5,210	72,800	39,400	26,900	18,200
12	29,000	16,800	22,500	82,000	18,600	13,200	5,870	4,780	58,200	34,900	25,900	18,600
13	27,900	17,900	28,700	69,600	17,400	13,500	5,770	4,420	42,400	31,100	24,400	19,766
14	41,000	18,700	37,200	62,000	16,500	18,700	5,670	4,250	34,700	28,300	26,600	21,400
15	88,100	22,200	42,400	59,600	15,300	34,000	5,410	4,250	30,500	26,400	27,400	25,500

Daily discharge, in second-feet, of Susquehanna River at Harrisburg, Pa., for 1911—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16	174,000	23,900	46,000	69,300	14,400	41,900	5,980	4,040	41,000	24,300	26,400	38,900
17	125,000	23,900	50,000	76,100	14,000	36,500	6,520	4,380	50,200	21,900	28,000	64,000
18	84,000	26,800	45,600	72,100	13,500	29,700	6,310	4,420	57,400	26,900	27,900	83,800
19	59,900	34,700	39,200	61,500	13,100	23,700	6,740	4,340	41,200	42,500	30,700	81,400
20	48,400	41,200	34,700	57,900	13,100	20,000	6,470	3,920	30,500	47,800	39,200	70,000
21	40,800	40,700	33,000	77,000	12,700	17,400	6,040	3,760	25,000	47,800	42,400	58,100
22	35,400	37,200	32,100	91,700	13,500	15,500	5,670	4,040	21,800	45,100	45,700	49,200
23	30,800	30,900	31,100	96,500	12,900	13,900	5,720	4,040	18,600	46,200	42,800	46,200
24	28,400	27,800	33,300	94,000	14,100	12,900	6,090	4,040	17,000	58,100	37,400	52,500
25	24,300	25,000	40,600	88,700	13,600	12,300	5,980	4,700	15,500	57,600	33,700	58,400
26	21,900	24,900	42,400	75,500	12,500	11,500	5,820	5,720	14,300	50,200	32,200	63,200
27	20,100	26,000	39,800	63,000	12,300	11,100	5,560	7,140	13,700	45,700	29,700	61,700
28	19,000	28,700	56,300	53,600	12,700	11,300	5,410	7,610	12,400	39,500	28,300	60,400
29	23,700	.....	132,000	46,000	14,600	10,500	4,930	12,600	12,700	34,400	27,000	57,100
30	54,400	.....	141,000	41,000	13,300	11,000	4,880	34,700	15,600	30,500	25,900	52,100
31	68,200	.....	113,000	.....	12,900	.....	4,780	56,800	.....	27,300	.....	48,300

NOTE.—Discharge determined from a well-defined rating curve. Discharge Jan. 1 and 2 reduced for effect of ice. No further corrections made for effect of ice during remainder of 1911.

Monthly discharge of Susquehanna River at Harrisburg, Pa., for 1911.

[Drainage area, 24,000 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	174,000	15,000	52,200	2.18	2.51	A.
February	59,200	16,600	28,400	1.18	1.23	A.
March	141,000	17,200	43,100	1.80	2.08	A.
April	124,000	41,000	73,200	3.05	3.40	A.
May	36,700	12,300	19,100	.796	.92	A.
June	41,900	10,500	16,300	.679	.76	B.
July	10,400	4,780	6,440	.268	.31	B.
August	56,800	3,760	8,170	.340	.39	B.
September	72,800	12,400	30,800	1.28	1.43	A.
October	99,500	18,600	42,800	1.78	2.05	A.
November	45,700	21,000	28,800	1.20	1.34	A.
December	83,800	17,900	41,200	1.72	1.98	A.
The year	174,000	3,760	32,500	1.35	18.40	

CHENANGO RIVER AT BINGHAMTON, N. Y.

Location.—At the Court Street Bridge, Binghamton, N. Y., 300 feet below Noyes dam, about 2,500 feet above the junction with the Susquehanna, and 14 miles below the mouth of Tioughnioga River, coming in from the right.

Records available.—July 31, 1901, to December 31, 1911. Data also in annual reports of New York State engineer and surveyor.

Drainage area.—1,530 square miles.

Gage.—Standard chain, fastened to the upstream side of the bridge; read twice daily; datum unchanged.

Channel.—Bed of river composed of cobble and gravel; fairly permanent. Very little vegetation at the bridge except at the sides.

Discharge measurements.—Made from the bridge.

Winter flow.—As a rule not greatly affected by the presence of ice, although at times ice jams form on the control point below the gage.

Diversion.—In estimating the run-off of the Chenango River basin the area directly tributary to the storage reservoirs, from which water is diverted to supply the Erie Canal is deducted from the total natural drainage area. The diversion area of six reservoirs at the head of Chenango River, whose outflow is turned into the river canal through Limestone Creek, is 30 square miles. The diversion area of De Ruyter reservoir at the head of Tioughnioga River, whose outflow is turned into Limestone Creek, is 18 square miles. These two drainage areas have been subtracted from the natural drainage area of 1,580 square miles, giving an effective area of 1,532 square miles. This estimate is approximate, as no allowance has been made for direct inflow to the feeder channels from additional areas nor for waste into the original stream. The gross area, from which more or less run-off is diverted, is about 105 square miles.

Accuracy.—Relation between gage height and discharge at times affected by backwater from Susquehanna River (at high stage) and ice jams on control point. At ordinary stages a slight riffle a short distance downstream from the bridge cuts off backwater from the Susquehanna. 1911 measurements have defined two rating curves, one of which is quite different from any hitherto used. Records can not be considered better than fair.

Cooperation.—Station established and maintained in cooperation with the State engineer and surveyor of New York.

Discharge measurements of Chenango River at Binghamton, N. Y., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 29	C. A. Cockroft	16.30	24,200
Apr. 6	do	12.60	16,000
21	C. S. De Golyer	7.90	4,080
June 14	do	9.39	5,250
16	do	7.16	2,290
Sept. 28	C. C. Covert	5.54	468
Oct. 4[a]	C. S. De Golyer	5.95	849

[a] Measurement made partly by wading under Court Street Bridge.

Daily gage height, in feet, of Chenango River at Binghamton, N. Y., for 1911.

[Hugh L. Smith and A. L. La Roche, observers.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.6	7.15	6.25	8.9	6.45	5.95	5.46	5.29	5.74	6.55	7.2	7.3
2	8.4	7.1	6.45	8.3	7.0	6.15	5.36	5.18	5.64	5.81	6.85	7.0
3	12.2	6.7	6.3	7.7	7.3	5.97	5.36	5.18	5.58	6.05	6.55	6.85
4	11.8	6.5	6.15	7.6	6.85	5.84	5.33	5.28	5.53	5.89	6.45	6.65
5	9.4	6.55	6.4	8.5	6.6	5.82	5.48	5.18	5.49	6.20	6.3	6.5
6	8.1	6.0	6.0	12.4	6.4	6.25	5.58	5.18	5.58	6.05	6.3	6.4
7	8.0	6.05	6.0	15.5	6.25	6.65	5.48	5.36	6.2	6.35	6.7	6.3
8	7.6	6.15	5.9	14.8	6.2	6.4	5.34	5.32	6.15	6.65	6.9	6.3
9	7.6	6.35	5.85	12.2	6.1	6.2	5.34	5.32	6.8	6.4	6.65	6.3
10	7.2	6.2	6.05	11.0	6.05	5.96	5.24	5.42	7.5	6.0	6.45	6.8
11	6.95	6.15	6.3	10.0	6.0	5.9	5.28	5.28	7.0	6.1	6.4	7.0
12	7.3	6.1	6.3	9.6	5.96	7.0	5.28	5.22	6.5	6.2	6.35	7.5
13	8.1	6.1	6.8	9.7	5.87	8.3	5.26	5.19	6.5	6.2	7.2	8.3
14	9.4	6.1	7.4	9.2	5.82	9.2	5.20	5.39	6.25	6.05	6.9	8.3
15	10.2	6.0	8.1	11.0	5.79	8.0	5.10	5.36	6.0	5.98	6.7	8.0
16	8.6	5.9	8.0	10.3	5.74	6.95	5.16	5.41	6.0	5.94	6.65	8.9
17	7.4	6.0	7.1	9.2	5.72	6.95	5.00	5.70	5.88	5.8	6.6	9.3
18	7.1	6.2	7.2	8.4	5.72	6.55	5.90	5.56	5.86	6.4	7.2	8.9
19	7.0	6.65	6.75	7.9	5.70	6.25	5.82	5.49	5.76	7.6	8.1	8.6
20	6.9	6.35	6.8	8.0	5.70	6.05	5.64	5.26	5.66	7.1	8.1	.....

Daily gage height, in feet, of Chenango River at Binghamton, N. Y., for 1911—Contd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
21	6.8	6.1	6.7	7.9	5.70	5.88	5.60	5.44	5.64	6.9	7.5	.....
22	6.7	6.1	7.0	8.0	5.68	5.77	5.54	5.35	5.56	6.75	7.3	6.9
23	6.6	6.1	8.6	8.3	5.63	5.68	5.49	5.35	5.62	8.2	6.95	10.0
24	6.2	6.1	8.3	7.9	6.35	5.72	5.53	5.35	5.60	8.2	6.9	10.0
25	6.4	6.05	7.4	7.4	7.1	5.68	5.47	5.34	5.60	7.4	7.0	8.9
26	6.3	6.15	7.6	7.1	6.7	5.57	5.54	5.38	5.61	6.95	6.9	8.6
27	6.45	6.4	12.9	6.9	6.35	5.58	5.44	5.46	5.50	6.8	6.8	8.6
28	11.3	6.55	18.1	6.7	6.10	5.66	5.44	5.39	5.32	6.65	6.8	8.2
29	10.5	.....	15.3	6.55	5.94	5.67	5.34	5.74	5.54	6.45	7.8	6.85
30	8.9	.....	12.1	6.45	5.80	5.54	5.17	6.05	5.46	6.35	7.8	6.55
31	7.4	.....	10.5	.....	5.74	.....	5.35	5.97	.....	6.5	.....	6.5

NOTE.—Relation of gage height to discharge probably affected by anchor ice from Feb. 7 to Mar. 11. There was also undoubtedly some backwater for brief periods during the remainder of January, February, and March. Gage heights were taken to water surface.

Daily discharge, in second-feet, of Chenango River at Binghamton, N. Y., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3,530	2,790	1,000	6,060	1,720	1,020	398	273	636	1,510	2,350	2,490
2	5,020	2,710	900	4,820	2,550	1,290	322	198	546	700	1,780	2,080
3	13,900	2,100	900	3,700	3,030	1,040	322	198	494	945	1,510	1,780
4	12,900	1,800	800	3,530	2,320	894	301	266	454	780	1,390	1,630
5	7,130	1,880	800	5,220	1,950	872	414	198	422	1,110	1,220	1,450
6	4,430	1,080	700	14,400	1,650	1,430	494	198	494	945	1,220	1,330
7	4,240	900	700	23,200	1,430	2,020	414	322	1,110	1,280	1,690	1,220
8	3,530	900	600	21,200	1,360	1,650	308	294	1,060	1,630	1,950	1,220
9	3,530	800	600	13,900	1,220	1,360	308	294	1,720	1,330	1,630	1,220
10	2,870	800	900	10,800	1,150	1,030	238	366	2,770	890	1,390	1,720
11	2,480	700	1,200	8,460	1,080	960	266	266	2,080	1,000	1,330	2,080
12	3,030	700	1,500	7,570	1,030	2,550	266	224	1,450	1,110	1,280	2,770
13	4,430	700	2,250	6,480	927	3,960	252	204	1,450	1,110	2,350	3,960
14	7,130	700	3,190	6,690	872	5,440	210	343	1,160	945	1,950	3,960
15	8,920	650	4,430	10,800	840	3,500	150	322	890	870	1,690	3,500
16	5,430	600	4,240	9,150	787	2,020	186	358	890	830	1,630	4,930
17	3,190	900	2,710	6,690	766	2,020	100	600	770	690	1,570	5,610
18	2,710	1,200	2,870	5,020	766	1,510	790	478	750	1,330	2,350	4,930
19	2,550	1,600	2,180	4,060	745	1,160	710	422	654	2,910	3,650	4,440
20	2,400	1,300	2,250	4,240	745	945	546	252	564	2,210	3,650	3,610
21	2,250	1,100	2,100	4,060	745	770	510	382	546	1,950	2,770	2,780
22	2,100	900	2,550	4,240	725	663	462	315	478	1,760	2,490	1,950
23	1,950	800	5,430	4,820	675	582	422	315	528	3,800	2,020	6,850
24	1,360	700	4,820	4,060	1,580	618	454	315	510	3,800	1,950	6,850
25	1,650	800	3,190	3,190	2,710	582	406	308	510	2,630	2,080	4,930
26	1,500	1,000	3,530	2,710	2,100	486	462	336	519	2,020	1,950	4,440
27	1,720	1,400	15,800	2,400	1,580	494	382	398	430	1,720	1,720	4,440
28	1,600	1,200	31,200	2,100	1,220	564	382	343	294	1,630	1,720	3,800
29	9,630	.....	22,600	1,880	1,010	573	308	636	462	1,390	3,200	1,780
30	6,060	.....	13,600	1,720	850	462	192	945	398	1,280	3,200	1,510
31	3,190	.....	9,630	.....	787	.....	315	860	.....	1,450	.....	1,450

NOTE.—Daily discharge determined from two discharge rating curves, the first applicable Jan. 1 to June 12, the second applicable June 13 to Dec. 31. Both curves are fairly well defined at low and medium stages, but at high stages are somewhat uncertain, owing to variable effect of backwater from Susquehanna River. Discharge Feb. 7 to Mar. 11 estimated from climatologic records and the discharge from adjacent drainage areas. Discharge Dec. 20 and 21 interpolated.

Monthly discharge of Chenango River at Binghamton, N. Y., for 1911.

[Drainage area, 1,530 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	13,900	1,360	4,400	2.88	3.32	B.
February	2,790	600	1,170	.765	.80	C.
March	31,200	600	4,810	3.14	3.62	B.
April	23,200	1,720	6,910	4.52	5.04	B.
May	3,030	675	1,320	.863	.99	B.
June	5,440	462	1,420	.928	1.04	B.
July	790	100	364	.238	.27	B.
August	945	198	362	.237	.27	B.
September	2,770	294	835	.546	.61	B.
October	3,800	690	1,530	1.00	1.15	B.
November	3,650	1,220	2,020	1.32	1.47	B.
December	6,850	1,220	3,120	2.04	2.35	B.
The year	31,200	100	2,360	1.54	20.93	

CHEMUNG RIVER AT CHEMUNG, N. Y.

Location.—About midway between Chemung, N. Y., and Willawana, Pa., about half a mile upstream from the State line, and about 10 miles above the junction with the Susquehanna.

Records available.—September 7, 1903, to December 31, 1911. Data also in annual reports of New York State engineer and surveyor.

Drainage area.—2,440 square miles.

Gage.—Tape-and-weight, read twice daily. The suspension bridge to which the gage was originally attached was removed during the summer of 1911, and on April 19, 1911, the gage was placed 250 feet upstream from the bridge. Gage readings were begun on the temporary gage, April 20, 1911. The suspension bridge is being replaced by a 2-span steel truss bridge, to which the gage will be attached. Datum unchanged up to the time of the removal of the bridge.

Channel.—Right bank high, clear, and not subject to overflow; left bank of medium height, wooded and overflowed at times of high water. Bed of river composed of sand and gravel; clear and fairly permanent.

Discharge measurements.—Made from the bridge.

Winter flow.—Affected by backwater caused by needle ice.

Artificial control.—Largest water power development on the river is at Elmira, N. Y. No dams on the river between Elmira and the mouth of the Chemung.

Accuracy.—Conditions for accurate determination of discharge during the open period only fair. Determination of discharge during the winter months liable to be considerably in error as a result of backwater caused by needle ice. Estimates of daily discharge for 1911 withheld pending confirmation of the discharge rating curve for the new section.

Cooperation.—Established and maintained by the United States Geological Survey in cooperation with the New York State engineer and surveyor.

Discharge measurements of Chemung River at Chemung, N. Y., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Apr. 20	C. S. DeGolyer	*a* 5.25	4,370
Oct. 5	.....do	*b* 3.47	1,290

a Gage moved on account bridge being torn down. Gage height referred to old datum.
b Measurement made by wading about ¼ mile below bridge. Gage height referred to old datum.

Daily gage height, in feet, of Chemung River at Chemung, N. Y., for 1911.

[D. L. Orcutt, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	3.6	5.1	4.7	3.55	2.19	1.93	1.65	2.8	3.0	2.75	3.3
2	.....	3.65	4.4	4.3	4.5	2.21	1.89	1.71	2.55	3.7	2.95	3.15
3	7.9	3.35	4.1	4.0	4.6	2.33	1.90	1.61	2.37	4.5	2.95	3.05
4	5.8	3.1	3.7	3.85	4.0	2.22	1.93	1.61	2.23	3.75	2.8	2.95
5	4.5	3.15	3.5	4.4	3.7	2.27	1.89	1.59	2.13	3.45	2.7	2.75
6	4.0	3.0	3.4	7.3	3.5	2.29	1.77	1.65	2.11	3.45	2.67	2.85
7	3.95	2.85	3.15	8.5	3.35	4.0	1.79	1.59	2.29	3.5	2.7	2.75
8	4.1	3.0	3.05	7.8	3.1	3.25	1.76	1.66	2.73	4.9	2.85	2.75
9	3.6	3.1	3.2	6.4	3.1	2.95	1.75	1.67	2.57	4.0	3.25	2.85
10	3.35	3.1	3.75	6.7	3.0	2.7	1.75	1.61	3.25	3.6	3.1	3.0
11	3.25	2.9	5.4	6.0	2.95	2.5	1.76	1.63	3.65	3.55	2.95	3.7
12	3.6	2.85	6.3	5.5	2.9	2.48	1.73	1.59	3.15	4.0	2.9	3.6
13	5.7	2.7	3.4	5.1	2.8	4.5	1.69	1.56	2.9	3.8	2.95	4.0
14	5.0	2.65	6.4	4.8	2.7	4.6	1.69	1.49	2.85	3.5	3.2	6.5
15	8.7	2.45	6.4	5.3	2.65	3.7	1.67	1.67	2.65	3.25	3.05	5.3
16	6.2	2.6	5.7	5.0	2.6	3.3	1.64	1.59	2.55	3.1	2.95	5.8
17	4.7	2.65	4.4	4.7	2.6	3.0	1.68	1.63	2.75	3.0	2.9	6.0
18	4.2	3.35	4.5	4.4	2.6	2.8	1.78	1.63	2.55	3.1	2.9	5.4
19	3.95	5.9	4.1	4.3	2.6	2.6	1.79	1.74	2.45	3.7	3.5	4.8
20	3.8	4.8	3.85	5.4	3.25	2.5	1.95	1.65	2.33	3.6	3.7	4.2
21	3.6	3.95	3.9	6.5	3.3	2.37	1.97	1.67	2.23	3.35	3.4	3.85
22	3.5	3.65	4.3	5.8	2.9	2.31	1.85	1.60	2.19	3.2	3.25	3.8
23	3.4	3.55	5.8	6.0	2.7	2.19	1.75	1.61	2.12	3.25	3.15	3.85
24	3.1	3.45	5.2	5.6	2.6	2.17	1.75	1.58	2.06	3.35	3.05	4.3
25	3.0	3.45	4.2	5.0	2.65	2.11	1.72	1.67	2.08	3.2	3.1	3.9
26	3.0	3.5	4.2	4.5	2.6	2.19	1.69	1.71	2.11	3.05	3.2	3.7
27	2.95	6.6	5.2	4.2	2.47	2.07	1.69	1.63	2.03	2.9	3.1	3.75
28	5.2	6.9	8.6	4.0	2.35	2.07	1.69	1.71	2.03	2.85	3.05	4.2
29	6.1	.....	6.7	3.75	2.6	2.00	1.67	3.1	2.19	2.8	3.2	3.4
30	5.1	.....	5.6	3.6	2.18	1.99	1.65	4.3	2.19	2.75	3.85	3.25
31	4.3	.....	5.2	.....	2.22	.....	1.61	3.25	.....	2.71	.....	3.3

NOTE.—Relation of gage height to discharge probably affected by ice Jan. 1 and 2, Feb. 8 to 14, and Feb. 19 to Mar. 9. There may also have been more or less backwater from ice at other times during January, February, and March. It is not known whether gage heights were to water surface or to top of the ice. Gage readings Apr. 20 to Dec. 31 made from a temporary staff gage located 250 feet above the bridge to which the original gage was attached.

WEST BRANCH OF SUSQUEHANNA RIVER AT WILLIAMSPORT, PA.

Location.—At the Market Street Bridge in Williamsport, 2 miles below the mouth of Lycoming Creek and about 2 miles above the mouth of Loyalsock Creek.

Records available.—March 1, 1895, to December 31, 1911.

Drainage area.—5,640 square miles.

Gage.—Standard chain, fastened to the bridge August 16, 1901; datum unchanged.

Channel.—Permanent.

Discharge measurements.—Made from the bridge or by wading. No measurement has been made since 1908.

Artificial control.—There is a dam about one-half mile above the station, but the operation of this dam probably has no effect on the relation of discharge to gage height.

Winter flow.—Affected by ice.

Accuracy.—Conditions of flow at this point are constant, and a good discharge rating curve has been developed.

Cooperation.—The station was established in 1895 by George D. Snyder, at that time city engineer of Williamsport. The chain gage was installed by the United States Geological Survey. The gage is now maintained and daily readings are furnished by the United States Weather Bureau.

Daily gage height, in feet, of West Branch of Susquehanna River at Williamsport, Pa., for 1911.

[H. H. Guise, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.5	6.8	4.2	6.5	4.85	2.45	2.15	1.34	5.23	4.92	4.31	4.0
2	5.3	6.0	5.1	5.9	5.00	2.75	2.05	1.34	4.63	7.42	3.91	4.0
3	5.6	5.4	5.4	4.4	5.35	2.65	1.95	1.54	4.07	15.92	3.71	3.9
4	6.2	5.1	5.5	4.2	5.00	2.65	1.85	1.54	3.63	10.92	3.51	3.8
5	6.5	4.8	4.4	5.2	4.55	2.80	1.75	1.64	2.93	8.52	3.21	3.8
6	6.5	4.5	4.0	5.7	4.35	2.55	1.75	1.74	2.83	6.82	3.01	3.7
7	4.6	3.8	3.7	5.3	4.20	2.45	1.55	1.74	3.23	6.42	2.91	3.7
8	4.4	3.7	3.5	9.4	3.75	2.35	1.45	1.74	3.03	7.32	3.01	3.6
9	4.4	3.7	3.3	9.0	3.70	2.35	1.45	1.64	3.33	8.02	4.31	3.5
10	3.9	4.0	3.3	8.1	3.45	2.40	1.35	1.64	11.13	7.12	4.51	3.5
11	3.2	3.5	3.6	7.7	3.45	2.25	1.45	1.54	9.43	6.42	4.41	3.8
12	3.0	3.2	3.7	7.3	3.50	2.35	1.25	1.54	7.23	5.82	4.51	4.0
13	3.4	3.0	4.7	6.8	3.35	2.65	1.35	1.54	6.83	5.42	4.41	4.2
14	7.8	3.4	5.0	6.3	3.10	5.45	1.35	1.44	5.03	5.02	4.41	5.0
15	12.3	3.2	5.2	7.1	2.95	5.20	1.45	1.44	4.53	5.72	4.21	5.4
16	15.5	4.4	4.9	8.7	2.95	5.05	1.45	1.74	4.73	5.42	4.01	6.9
17	9.3	4.5	4.6	8.1	2.80	4.95	1.55	1.54	5.93	5.32	4.01	9.6
18	6.5	4.7	4.5	7.5	2.65	4.75	1.75	1.44	5.03	5.22	4.31	9.9
19	5.7	4.9	4.6	6.7	2.80	4.25	1.65	1.44	6.03	6.02	4.21	8.7
20	5.2	5.8	4.9	6.9	2.95	3.60	1.65	1.34	5.23	5.92	4.11	7.7
21	4.3	5.1	4.7	8.0	2.85	2.95	1.55	1.34	4.63	6.22	4.91	6.4
22	3.6	4.2	4.4	8.3	2.70	2.55	1.55	1.34	4.13	6.42	5.71	5.6
23	4.6	3.7	4.3	7.8	2.65	2.45	1.45	1.34	3.63	5.72	6.01	6.1
24	4.4	4.5	4.2	7.4	2.80	2.25	1.45	1.34	3.43	5.62	5.31	5.8
25	4.0	4.1	5.0	6.4	2.95	2.50	1.45	1.54	3.33	5.32	5.31	5.8
26	3.8	4.0	4.7	6.4	2.85	2.25	1.45	2.04	3.23	5.22	5.01	5.5
27	3.7	4.5	5.3	6.4	2.90	2.35	1.45	2.14	3.03	5.02	4.81	5.8
28	4.1	4.4	5.4	6.2	2.75	2.25	1.45	2.74	2.83	4.72	4.61	5.9
29	7.8	.....	9.1	5.8	2.60	2.25	1.45	2.94	3.43	4.42	4.21	5.4
30	8.2	.....	8.0	5.3	2.45	2.20	1.35	7.44	3.93	4.12	4.21	5.6
31	7.2	.....	7.3	.....	2.40	.....	1.35	6.84	.....	3.92	.....	5.3

NOTE.—River reported open at the gage Jan. 1; partly open below the dam Jan. 2 to 14, and river open Jan. 15. It is probable that there was backwater from ice about Jan. 1, 5–10, and 23–27. Probably backwater at times during February and the 1st of March. Gage heights not affected by ice during December.

Daily discharge, in second-feet, of West Branch of Susquehanna River at Williamsport, Pa., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	10,000	21,900	10,400	20,400	13,000	5,100	4,340	2,500	14,600	13,300	10,800	9,690
2	14,900	18,100	14,000	17,600	13,600	5,880	4,100	2,500	12,100	25,000	9,390	9,690
3	16,200	15,400	15,400	11,200	15,100	5,620	3,860	2,920	9,940	87,600	8,740	9,360
4	19,000	14,000	15,800	10,400	13,600	5,620	3,620	2,920	8,490	44,900	8,120	9,030
5	15,000	12,800	11,200	14,500	11,700	6,020	3,380	3,140	6,380	30,800	7,200	9,030
6	12,000	11,500	9,690	16,700	11,000	5,360	3,380	3,360	6,100	22,000	6,610	8,710
7	10,000	9,030	8,710	14,900	10,400	5,100	2,940	3,330	7,260	20,000	6,330	8,710
8	9,000	8,710	8,090	35,700	8,870	4,840	2,720	3,360	6,670	24,500	6,610	8,400
9	8,000	8,710	7,470	33,500	8,710	4,840	2,720	3,140	7,560	28,100	10,800	8,090
10	8,000	9,690	7,470	28,500	7,940	4,970	2,520	3,140	46,200	23,500	11,600	8,090
11	7,170	8,090	8,400	26,400	7,940	4,600	2,720	2,920	35,900	20,000	11,200	9,030
12	6,580	7,170	8,710	24,400	8,090	4,840	2,310	2,920	24,000	17,200	11,600	9,690
13	7,780	6,580	12,300	21,900	7,620	5,620	2,520	2,920	22,000	15,400	11,200	10,400
14	27,000	7,780	13,600	19,500	6,870	15,600	2,520	2,700	13,700	13,700	11,200	13,600
15	54,600	7,170	14,500	23,400	6,440	14,500	2,720	2,700	11,700	16,800	10,400	15,400
16	83,400	11,200	13,200	31,800	6,440	13,800	2,720	3,360	12,500	15,400	9,720	22,400
17	35,100	11,500	11,900	28,500	6,020	13,400	2,940	2,920	17,700	15,000	9,720	36,800
18	20,400	12,300	11,500	25,400	5,620	12,500	3,380	2,700	13,700	14,600	10,800	38,600
19	16,700	13,200	11,900	21,400	6,020	10,600	3,160	2,700	18,200	18,200	10,400	31,800
20	14,500	17,200	13,200	22,400	6,440	8,400	3,160	2,500	14,600	17,700	10,100	26,400

Daily discharge, in second-feet, of West Branch of Susquehanna River at Williamsport, Pa., for 1911—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
21	10,800	14,000	12,300	28,000	6,160	6,440	2,940	2,500	12,100	19,100	13,200	19,900
22	8,400	10,400	11,200	29,600	5,750	5,360	2,940	2,500	10,100	20,000	16,700	16,200
23	7,500	8,710	10,800	27,000	5,620	5,100	2,720	2,500	8,490	16,800	18,100	18,500
24	7,000	11,500	10,400	24,900	6,020	4,600	2,720	2,500	7,870	16,300	15,000	17,200
25	6,500	10,000	13,600	19,900	6,440	5,230	2,720	2,920	7,560	15,000	15,000	17,200
26	6,500	9,690	12,300	19,900	6,160	4,600	2,720	4,080	7,260	14,600	13,600	15,800
27	8,000	11,500	14,900	19,900	6,300	4,840	2,720	4,320	6,660	13,700	12,800	17,200
28	10,000	11,200	15,400	19,000	5,880	4,600	2,720	5,860	6,100	12,400	12,000	17,600
29	27,000	.....	34,000	17,200	5,490	4,600	2,720	6,410	7,870	11,200	10,400	15,400
30	29,100	.....	28,000	14,900	5,100	4,470	2,520	25,100	9,460	10,100	10,400	16,200
31	23,900	.....	24,400	.....	4,970	.....	2,520	22,100	.....	9,430	.....	14,900

NOTE.—Discharge determined from a well-defined rating curve. Discharge Jan. 1, 5–10, and 23–27, reduced for probable effect of backwater from ice. No further corrections made for effect of ice during January, February, or March. The determinations of discharge at times during February and the first part of March are probably excessive.

Monthly discharge of West Branch of Susquehanna River at Williamsport, Pa., for 1911.

[Drainage area, 5,640 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	83,400	[a]6,500	17,200	3.05	3.52	B.
February	21,900	6,580	11,400	2.02	2.10	B.
March	34,000	7,470	13,400	2.38	2.74	A.
April	35,700	10,400	22,300	3.95	4.41	A.
May	15,100	4,970	7,910	1.40	1.61	A.
June	15,600	4,470	6,900	1.22	1.36	B.
July	4,340	2,310	2,960	.525	.61	B.
August	25,100	2,500	4,500	.798	.92	B.
September	46,200	6,100	13,100	2.32	2.59	A.
October	87,600	9,430	20,700	3.67	4.23	A.
November	18,100	6,330	11,000	1.95	2.18	A.
December	38,600	8,090	15,800	2.80	3.23	A.
The year	87,600	2,310	12,300	2.18	29.50	

[a] Estimated, ice present.

JUNIATA RIVER AT NEWPORT, PA.

Location.—At the steel highway bridge, about 800 feet east of the public square at Newport, 1 mile below the mouth of Buffalo Creek and about 12 miles above the mouth of the river.

Records available.—March 21, 1899, to July 15, 1906; January 6, 1907, to December 31, 1911.

Drainage area.—3,480 square miles.

Gage.—Chain, attached to the bridge; datum unchanged.

Discharge measurements.—Made from the bridge.

Winter flow.—Affected by ice.

Channel.—Conditions of flow liable to change from year to year.

Accuracy.—A good discharge rating curve has been developed for high and medium stages; low stage fair.

Cooperation.—Now maintained by Pennsylvania State Water Supply Commission, which furnishes tables of daily gage heights and discharge measurements made by engineers of the commission.

The following discharge measurement was made by R. A. Boehringer:
December 9, 1911:[1] Gage height, 3.63 feet; discharge, 1,650 second-feet.

[1] Affected by backwater from fish dam below gage.

Daily gage height, in feet, of Juniata River at Newport, Pa., for 1911.

[A. R. Bortel, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.85	5.60	4.45	4.90	4.75	3.57	3.50	2.81	7.39	5.04	4.18	3.98
2	4.20	5.10	4.40	4.75	4.70	3.35	3.40	2.89	7.16	6.24	4.08	3.95
3	4.50	4.50	4.35	4.55	4.73	3.30	3.15	3.05	5.49	7.34	4.03	3.83
4	6.65	4.40	4.35	4.55	4.45	3.40	3.07	3.23	4.89	5.64	3.98	3.83
5	7.15	4.20	4.20	5.10	4.42	3.40	3.10	3.05	4.19	5.14	3.83	3.78
6	6.65	4.25	4.00	6.60	4.20	3.35	3.05	3.30	4.29	4.79	3.88	3.85
7	6.15	4.05	3.90	7.40	4.07	3.65	3.05	3.07	4.04	4.94	4.18	3.68
8	5.70	3.80	3.93	6.95	4.03	3.60	3.17	3.17	4.02	5.64	4.63	3.75
9	5.30	4.00	3.88	6.25	3.97	3.43	3.17	3.07	4.39	5.16	4.43	3.62
10	5.00	3.82	3.85	5.80	3.95	3.48	3.15	3.05	7.14	4.84	4.35	3.70
11	4.95	3.90	4.07	5.65	3.93	3.43	3.03	2.97	6.09	4.69	4.23	3.70
12	4.35	3.72	4.50	5.40	3.80	3.48	3.00	2.85	5.49	4.54	4.23	3.72
13	4.70	3.80	4.73	5.20	3.75	3.40	3.05	2.93	4.79	4.39	4.23	3.64
14	9.43	4.10	4.82	5.00	3.70	3.67	3.03	2.87	4.39	4.24	4.28	3.72
15	10.40	4.00	4.65	5.40	3.70	3.72	3.00	2.84	4.89	4.16	4.18	3.83
16	8.75	5.70	4.50	5.50	3.55	3.53	3.00	2.90	9.46	4.06	4.13	4.48
17	6.50	5.45	4.50	5.30	3.51	3.45	2.93	2.90	8.79	4.02	4.13	6.05
18	5.45	5.50	4.43	5.05	3.51	3.33	3.03	2.79	7.14	4.42	4.33	6.90
19	5.00	6.10	4.40	4.90	3.53	3.20	2.97	2.77	5.74	4.24	4.73	6.00
20	4.50	5.85	4.27	5.45	3.45	3.28	2.95	2.87	5.19	5.19	4.91	5.38
21	4.40	5.60	4.40	7.00	3.47	3.20	2.90	2.80	4.72	5.06	4.73	5.02
22	4.30	5.10	4.45	6.60	3.41	3.23	2.85	2.80	4.49	4.84	4.58	4.80
23	4.10	4.75	4.33	6.75	3.27	3.27	2.87	2.77	4.29	5.09	4.48	5.12
24	4.05	4.70	4.28	7.20	3.53	3.27	2.90	2.79	4.09	5.39	4.38	5.42
25	3.85	4.35	4.15	7.00	3.57	3.22	2.90	3.06	4.14	5.14	4.38	5.45
26	3.80	4.40	4.05	6.50	3.47	3.15	2.97	3.25	3.84	4.89	4.33	5.25
27	3.75	4.50	4.40	5.95	3.33	3.50	2.93	3.40	3.89	4.66	4.15	5.70
28	3.65	4.55	5.40	5.50	3.27	3.47	2.85	3.33	3.74	4.54	4.21	6.65
29	4.20	.....	5.60	5.15	3.15	3.60	2.93	4.07	4.64	4.43	4.08	6.52
30	4.30	.....	5.30	4.85	3.25	3.58	2.80	4.65	5.14	4.29	4.03	5.70
31	4.85	.....	5.15	.....	3.17	.....	2.73	6.25	.....	4.24	.....	5.40

NOTE.—Ice reported gorged one-fourth mile below gage Jan. 4; gage height probably not very greatly increased thereby. The effect of backwater throughout January is considered slight. Slight backwater at times during February and the first part of March. No ice in December.

Daily discharge, in second-feet, of Juniata River at Newport, Pa., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,590	7,620	4,190	5,480	5,040	1,960	1,810	737	13,700	5,900	3,450	2,920
2	3,500	6,080	4,050	5,040	4,900	1,530	1,620	833	12,800	9,670	3,180	2,840
3	4,330	4,330	3,910	4,470	4,990	1,440	1,190	1,040	7,280	13,500	3,050	2,540
4	11,000	4,050	3,910	4,470	4,190	1,620	1,070	1,320	5,450	7,740	2,920	2,540
5	12,800	3,500	3,500	6,080	4,110	1,620	1,120	1,040	3,470	6,200	2,540	2,420
6	11,000	3,640	2,970	10,900	3,500	1,530	1,040	1,440	3,740	5,160	2,660	2,590
7	9,380	3,100	2,710	13,700	3,150	2,130	1,040	1,070	3,070	5,600	3,450	2,200
8	7,930	2,470	2,790	12,100	3,050	2,020	1,220	1,220	3,020	7,740	4,700	2,360
9	6,690	2,970	2,660	9,700	2,890	1,680	1,220	1,070	4,020	6,260	4,130	2,060
10	5,780	2,520	2,590	8,250	2,840	1,770	1,190	1,040	12,800	5,310	3,910	2,240
11	5,630	2,710	3,150	7,780	2,790	1,680	1,020	936	9,180	4,870	3,580	2,240
12	3,910	2,290	4,330	7,000	2,470	1,770	975	785	7,280	4,440	3,580	2,290
13	4,900	2,470	4,990	6,380	2,360	1,620	1,040	884	5,160	4,020	3,580	2,110
14	21,700	3,230	5,250	5,780	2,240	2,170	1,020	809	4,020	3,610	3,720	2,290
15	25,900	2,970	4,760	7,000	2,240	2,290	975	773	5,450	3,390	3,450	2,540
16	18,900	7,930	4,330	7,310	1,920	1,870	975	845	21,900	3,130	3,310	4,270
17	10,500	7,160	4,330	6,690	1,830	1,720	884	845	19,100	3,020	3,310	9,050
18	7,160	7,310	4,130	5,930	1,830	1,490	1,020	714	12,800	4,110	3,850	11,900
19	5,780	9,210	4,050	5,480	1,870	1,270	936	690	8,060	3,610	4,990	8,890
20	4,330	8,410	3,690	7,160	1,720	1,410	910	809	6,350	6,350	5,510	6,940

Daily discharge, in second-feet, of Juniata River at Newport, Pa., for 1911—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
21	4,050	7,620	4,050	12,300	1,750	1,270	845	725	4,960	5,960	4,990	5,840
22	3,770	6,080	4,190	10,900	1,640	1,320	785	725	4,300	5,310	4,550	5,190
23	3,230	5,040	3,850	11,400	1,390	1,390	809	690	3,740	6,050	4,270	6,140
24	3,100	4,900	3,720	13,000	1,870	1,390	845	714	3,200	6,970	3,990	7,060
25	2,590	3,910	3,360	12,300	1,960	1,300	845	1,060	3,340	6,200	3,990	7,160
26	2,470	4,050	3,100	10,500	1,750	1,190	936	1,360	2,570	5,450	3,850	6,540
27	2,360	4,330	4,050	8,730	1,490	1,810	884	1,620	2,690	4,780	3,360	7,930
28	2,130	4,470	7,000	7,310	1,390	1,750	785	1,490	2,330	4,440	3,530	11,000
29	3,500	.....	7,620	6,230	1,190	2,020	884	3,150	4,730	4,130	3,180	10,600
30	3,770	.....	6,690	5,340	1,360	1,980	725	4,760	6,200	3,740	3,050	7,930
31	5,340	.....	6,230	.....	1,220	.....	644	9,700	.....	3,610	.....	7,000

NOTE.—Discharge determined from a rating curve well defined at medium and high stages and fairly well defined at low stages. No correction made for effect of backwater during January to March. It is probable that very little error has resulted from the application of the open-channel rating during the winter.

Monthly discharge of Juniata River at Newport, Pa., for 1911.

[Drainage area, 3,480 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	25,900	2,130	7,100	2.04	2.35	B.
February	9,210	2,290	4,800	1.38	1.44	B.
March	7,620	2,590	4,200	1.21	1.40	A.
April	13,700	4,470	8,160	2.34	2.61	A.
May	5,040	1,220	2,480	.713	.82	B.
June	2,290	1,190	1,670	.480	.54	B.
July	1,810	644	1,010	.290	.33	B.
August	9,700	690	1,450	.417	.48	B.
September	21,900	2,330	6,890	1.98	2.21	A.
October	13,500	3,020	5,490	1.58	1.82	A.
November	5,510	2,540	3,720	1.07	1.19	A.
December	11,900	2,060	5,150	1.48	1.71	A.
The year	25,900	644	4,330	1.24	16.90	

POTOMAC RIVER BASIN.

POTOMAC RIVER AT POINT OF ROCKS, MD.

Location.—At the steel highway bridge at Point of Rocks, about one-third mile below the mouth of Catoctin Creek and about 6 miles above the mouth of Monocacy River.

Records available.—February 17, 1895, to December 31, 1911.

Drainage area.—9,650 square miles.

Gage.—Chain, attached to bridge. Datum constant since September 2, 1902; prior to this date datum was 0.45 foot higher than at present.

Channel.—Practically permanent. The discharge is controlled by a ledge a few hundred feet below the station, the ledge extending completely across the river except for one relatively unimportant channel.

Discharge measurements.—Made from the bridge.

Winter flow.—Little affected by ice.

Canal.—The Chesapeake & Ohio Canal parallels the Potomac on the Maryland side. The average discharge of the canal is 75 to 100 second-feet. This discharge is not included in the following tables.

Accuracy.—Present discharge rating curve considered very accurate; should require relatively little change in the future.

Daily gage height, in feet, of Potomac River at Point of Rocks, Md., for 1911.

[G. H. Hickman, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.0	10.5	3.1	2.6	2.6	1.25	1.7	0.68	14.6	2.2	1.85	1.9
2	1.85	6.0	3.2	2.6	2.8	1.3	1.4	.63	11.4	2.4	1.8	1.85
3	2.8	5.0	3.0	2.5	2.8	1.25	1.3	.63	5.9	2.1	1.7	1.75
4	7.0	5.0	2.7	2.6	2.8	1.25	1.2	.65	4.0	2.2	1.55	1.8
5	6.5	3.5	2.4	2.8	2.5	1.35	1.1	.95	3.8	3.0	1.4	1.8
6	5.6	3.3	2.3	7.4	2.4	1.3	1.05	1.25	2.6	2.4	1.35	1.65
7	4.1	3.0	2.2	9.5	2.2	1.25	1.0	1.15	2.3	2.2	1.7	1.7
8	3.5	2.8	2.1	7.5	2.1	1.25	1.3	1.1	2.0	1.7	2.7	1.65
9	2.6	2.6	2.0	5.6	2.0	1.35	1.7	.90	1.85	2.0	3.8	1.6
10	2.2	2.5	2.0	5.1	1.95	1.25	1.3	.95	1.7	3.2	3.4	1.55
11	2.1	2.4	2.3	5.0	1.9	1.7	1.45	.95	2.1	2.6	3.0	1.5
12	1.85	2.3	3.0	4.7	1.85	1.65	1.35	.85	2.0	2.3	2.6	1.5
13	1.85	2.3	4.5	4.6	1.75	1.55	1.2	.92	1.85	2.2	2.5	1.5
14	2.0	2.4	4.6	4.6	1.7	1.5	1.2	.65	1.65	2.2	2.4	1 5
15	5.1	2.8	4.7	4.5	1.65	1.5	1.2	.80	1.8	2.1	2.4	1.55
16	4.6	3.3	4.6	4.4	1.6	1.5	1.0	.75	2.1	2.0	2.1	2.0
17	4.0	3.4	4.5	4.0	1.6	1.5	1.3	.70	5.6	1.85	2.1	2.7
18	3.3	3.0	4.3	3.6	1.55	1.15	1.05	.75	4.6	2.6	2.1	5.2
19	2.7	2.8	3.7	3.4	1.5	1.35	.95	.90	3.5	5.0	2.1	4.4
20	2.4	3.0	3.4	3.3	1.45	1.6	.85	.80	2.9	7.1	2.3	3.2
21	2.2	2.6	3.3	3.2	1.4	2.7	.80	.70	2.5	5.1	2.4	2.9
22	2.1	2.6	3.2	3.2	1.35	1.95	.90	.65	2.3	3.8	2.5	2.4
23	2.0	2.4	3.1	3.1	1.35	1.7	.85	.60	2.0	3.6	2.3	1.8
24	2.1	2.4	3.0	3.2	.....	1.5	.75	.65	2.0	3.2	2.3	5.0
25	2.2	2.3	2.8	3.2	.....	1.35	.85	.70	1.9	2.9	2.2	5.8
26	2.7	2.2	2.6	3.3	.....	1.7	.72	.78	1.75	2.7	2.0	5.2
27	2.6	2.8	2.4	3.2	.....	1.6	.80	1.2	1.65	2.4	2.2	5.4
28	2.9	3.0	2.4	3.2	.....	2.6	.65	1.05	1.55	2.3	2.0	6.5
29	4.4	.....	2.5	3.0	1.15	2.35	.45	.90	1.6	2.1	1.95	6.1
30	4.9	.....	2.6	2.6	1.1	2.0	.60	1.65	1.55	2.0	1.95	4.9
31	10.2	.....	2.5	.....	1.1	.....	.60	6.0	.....	1.9	.....	4.4

NOTE.—There was undoubtedly some backwater from ice at this station for brief periods of a few days each during January and February. All gage readings are probably to water surface.

Daily discharge, in second-feet, of Potomac River at Point of Rocks, Md., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,980	59,800	9,530	7,330	7,330	2,660	4,010	1,190	93,800	5,750	4,500	4,670
2	4,500	26,100	10,000	7,330	8,180	2,800	3,090	1,080	67,200	6,520	4,330	4,500
3	8,180	19,800	9,070	6,920	8,180	2,660	2,800	1,080	25,500	5,380	4,010	4,170
4	32,800	19,800	7,750	7,330	8,180	2,660	2,520	1,120	14,100	5,750	3,540	4,330
5	29,400	11,500	6,520	8,180	6,920	2,940	2,250	1,860	13,000	9,070	3,090	4,330
6	23,600	10,500	6,130	35,600	6,520	2,800	2,120	2,660	7,330	6,520	2,940	3,860
7	14,600	9,070	5,750	51,600	5,750	2,660	1,990	2,380	6,130	5,750	4,010	4,010
8	11,500	8,180	5,380	36,300	5,380	2,660	2,800	2,250	5,020	4,010	7,750	3,860
9	7,330	7,320	5,020	23,600	5,020	2,940	4,010	1,740	4,500	5,020	13,000	3,700
10	5,750	6,920	5,020	20,400	4,840	2,660	2,800	1,860	4,010	10,000	11,000	3,540
11	5,380	6,520	6,130	19,800	4,670	4,010	3,240	1,860	5,380	7,330	9,070	3,390
12	4,500	6,130	9,070	18,000	4,500	3,860	2,940	1,610	5,020	6,130	7,330	3,390
13	4,500	6,130	16,900	17,400	4,170	3,540	2,520	1,790	4,500	5,750	6,920	3,390
14	5,020	6,520	17,400	17,400	4,010	3,390	2,520	1,120	3,860	5,750	6,520	3,390
15	20,400	8,180	18,000	16,800	3,860	3,390	2,520	1,480	4,330	5,380	6,520	3,540
16	17,400	10,500	17,400	16,300	3,700	3,390	1,990	1,360	5,380	5,020	5,380	5,020
17	14,100	11,000	16,800	14,100	3,700	3,390	2,800	1,240	23,600	4,500	5,380	7,750
18	10,500	9,070	15,700	12,000	3,540	2,380	2,120	1,360	17,400	7,330	5,380	21,100
19	7,750	8,180	12,500	11,000	3,390	2,940	1,860	1,740	11,500	19,800	5,380	16,300
20	6,520	9,070	11,000	10,500	3,240	3,700	1,610	1,480	8,620	33,500	6,130	10,000
21	5,750	7,330	10,500	10,000	3,090	7,750	1,480	1,240	6,920	20,400	6,520	8,620
22	5,380	7,330	10,000	10,000	2,940	4,840	1,740	1,120	6,130	13,000	6,920	6,520
23	5,020	6,520	9,530	9,530	2,940	4,010	1,610	1,010	5,020	12,000	6,130	4,330
24	5,380	6,520	9,070	10,000	2,850	3,390	1,360	1,120	5,020	10,000	6,130	19,800
25	5,750	6,130	8,180	10,000	2,760	2,940	1,610	1,240	4,670	8,620	5,750	24,800

Daily discharge, in second-feet, of Potomac River at Point of Rocks, Md., for 1911—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
26	7,750	5,750	7,330	10,500	2,660	4,010	1,290	1,440	4,170	7,750	5,020	21,100
27	7,330	8,180	6,520	10,000	2,570	3,700	1,480	2,520	3,860	6,520	5,750	22,300
28	8,620	9,070	6,520	10,000	2,470	7,330	1,120	2,120	3,540	6,130	5,020	29,400
29	16,300	.....	6,920	9,070	2,380	6,320	680	1,740	3,700	5,380	4,840	26,800
30	19,200	.....	7,330	7,330	2,250	5,020	1,010	3,860	3,540	5,020	4,840	19,200
31	57,300	.....	6,920	.....	2,250	.....	1,010	26,100	.....	4,670	.....	16,300

NOTE.—Daily discharge determined from a well-defined discharge rating curve. No correction has been made for backwater from ice during January or February.

Monthly discharge of Potomac River at Point of Rocks, Md., for 1911.

[Drainage area, 9,650 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	57,300	1,990	12,200	1.26	1.45	A.
February	59,800	5,750	11,300	1.17	1.22	A.
March	18,000	5,020	9,670	1.00	1.15	A.
April	51,600	6,920	15,100	1.56	1.74	A.
May	8,180	2,250	4,330	.449	.52	A.
June	7,750	2,380	3,690	.382	.43	A.
July	4,010	680	2,160	.224	.26	A.
August	26,100	1,010	2,440	.253	.29	A.
September	93,800	3,540	12,600	1.31	1.46	A.
October	33,500	4,010	8,510	.882	1.02	A.
November	13,000	2,940	5,970	.619	.69	A.
December	29,400	3,390	10,200	1.06	1.22	A.
The year	93,800	680	8,150	.845	11.45	

MONOCACY RIVER NEAR FREDERICK, MD.

Location.—At the county bridge on the toll road leading from Frederick to Mount Pleasant, Md., about 3,000 feet below the mouth of Tuscarora Creek (entering from the right) and about 2,000 feet above Israel Creek (entering from the left).

Records available.—August 4, 1896, to December 31, 1911.

Drainage area.—660 square miles.

Gage.—Chain, attached to the bridge; datum unchanged.

Channel.—Liable to change somewhat from year to year.

Discharge measurements.—Made from the bridge or by wading.

Winter flow.—More or less affected by ice.

Accuracy.—Changes in rating curve are required by change in conditions of flow.

The following discharge measurement was made by J. G. Mathers:

November 18, 1911: Gage height, 6.28 feet; discharge 1,040 second-feet.

Daily gage height, in feet, of Monocacy River near Frederick, Md., for 1911.

[E. L. Derr, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.7	5.3	5.3	5.6	5.2	4.4	4.2	3.7	20.3	5.4	4.8	5.3
2	5.7	5.2	5.2	5.4	5.7	4.4	4.1	4.3	8.6	5.0	4.8	5.2
3	6.3	5.3	4.9	4.9	5.3	4.4	4.0	5.0	6.8	4.9	4.8	5.1
4	6.0	5.5	5.0	6.8	5.0	4.4	3.9	5.6	6.4	4.8	4.8	5.1
5	5.9	5.4	4.9	9.15	5.0	4.4	3.8	5.4	6.2	4.5	4.7	5.0
6	5.7	5.4	4.8	7.0	4.9	5.3	3.8	5.2	6.0	4.6	6.7	5.0
7	5.2	5.4	4.8	6.5	4.8	5.4	3.7	4.9	5.3	4.5	8.4	4.9
8	4.4	5.4	4.9	6.3	4.8	4.9	4.6	4.4	4.8	4.4	6.4	4.9
9	4.4	5.2	4.8	6.1	4.7	4.5	4.8	4.0	4.3	4.1	5.6	4.9
10	4.5	4.8	6.3	5.9	4.7	4.5	4.4	3.9	4.2	3.9	5.3	4.9
11	4.4	4.6	7.2	5.6	4.8	4.4	4.1	4.0	5.4	4.0	5.2	4.8
12	4.8	4.8	5.6	5.3	4.6	4.4	4.1	3.9	4.1	4.4	5.2	4.8
13	5.2	6.3	5.3	5.2	4.5	4.6	4.1	3.8	5.0	4.4	6.8	4.8
14	5.0	6.3	5.4	5.2	4.5	4.5	4.1	3.8	4.8	4.3	6.3	4.8
15	5.0	6.3	5.5	5.7	4.4	4.4	4.0	3.9	5.4	4.2	5.8	5.3
16	5.2	6.1	7.1	5.4	4.5	4.4	4.0	3.9	7.4	4.3	5.8	6.4
17	4.9	5.9	6.8	5.1	4.4	4.4	4.9	3.9	6.4	4.3	5.6	8.5
18	4.5	6.55	6.3	5.0	4.4	4.4	4.9	4.0	5.8	7.8	6.1	6.4
19	4.4	6.4	6.1	5.2	4.3	5.4	4.4	4.0	5.4	7.8	6.7	6.1
20	4.4	6.3	6.3	6.4	4.3	5.3	4.2	4.0	4.9	6.1	6.4	5.5
21	4.2	5.8	7.0	6.5	4.3	4.5	4.1	4.2	4.9	5.6	5.9	5.5
22	4.5	5.2	6.7	6.5	4.4	4.2	5.0	4.0	4.8	5.6	5.4	5.7
23	4.7	5.2	6.0	7.2	4.3	4.3	4.2	3.7	4.7	7.5	5.4	10.2
24	4.5	5.2	5.2	6.5	4.4	4.3	4.2	3.7	4.6	7.4	5.4	8.4
25	4.5	6.2	4.9	6.2	4.4	4.3	4.1	4.7	4.6	6.7	6.5	6.8
26	4.6	6.8	4.9	5.7	4.4	4.2	4.1	4.7	4.6	5.6	5.5	6.7
27	4.7	6.3	4.9	5.5	4.5	4.2	4.0	10.45	4.5	5.4	5.4	11.4
28	6.3	5.9	6.3	5.3	4.3	4.2	3.9	12.05	4.5	5.3	5.3	9.5
29	6.8	.....	5.7	5.2	4.2	4.2	3.9	8.2	4.7	5.2	5.4	6.4
30	8.6	.....	5.7	5.2	4.2	4.2	3.8	8.3	5.9	4.9	5.4	6.3
31	6.2	.....	5.6	.....	4.2	.....	3.8	22.35	.....	4.9	.....	7.5

NOTE.—Relation of gage height to discharge affected by ice for brief periods of a few days during January and February. All gage readings are probably to water surface.

Daily discharge, in second-feet, of Monocacy River near Frederick, Md., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	320	584	584	734	537	214	154	38	15,200	632	360	584
2	789	537	537	632	789	214	127	183	3,140	446	360	537
3	1,170	584	402	402	584	214	102	446	1,540	402	360	491
4	969	682	446	1,540	446	214	79	734	1,240	360	360	491
5	906	632	402	3,670	446	214	57	632	1,100	247	320	446
6	789	632	360	1,700	402	584	57	537	969	282	1,460	446
7	537	632	360	1,320	360	632	38	402	584	247	2,960	402
8	214	632	402	1,170	360	402	282	214	368	214	1,240	402
9	214	537	360	1,030	320	247	360	102	183	127	734	402
10	247	360	1,170	906	320	247	214	79	154	79	584	402
11	214	282	1,880	734	360	214	127	102	632	102	537	360
12	360	360	734	584	282	214	127	79	127	214	537	360
13	537	1,170	584	537	247	282	127	57	446	214	1,540	360
14	446	1,170	632	537	247	247	127	57	368	183	1,170	360
15	446	1,170	682	789	214	214	102	79	632	154	846	584
16	537	1,030	1,790	632	247	214	102	79	2,040	183	846	1,240
17	402	906	1,540	491	214	214	402	79	1,240	183	734	3,050
18	247	1,350	1,170	446	214	214	402	102	846	2,400	1,030	1,240
19	214	1,240	1,030	537	183	632	214	102	632	2,400	1,460	1,030
20	214	1,170	1,170	1,240	183	584	154	102	402	1,030	1,240	682
21	154	846	1,700	1,320	183	247	127	154	402	734	906	682
22	247	537	1,460	1,320	214	154	446	102	360	734	632	789
23	320	537	969	1,880	183	183	154	38	320	2,130	632	4,700
24	247	537	537	1,320	214	183	154	38	282	2,040	632	2,960
25	247	1,100	402	1,100	214	183	127	320	282	1,460	1,320	1,540
26	282	1,540	402	789	214	154	127	320	282	734	682	1,460
27	320	1,170	402	682	247	154	102	4,950	247	632	632	5,900
28	1,170	906	1,170	584	183	154	79	6,550	247	584	584	4,000
29	1,540	.....	789	537	154	154	79	2,760	320	537	632	1,240
30	3,140	.....	789	537	154	154	57	2,860	906	402	632	1,170
31	1,100	.....	734	.....	154	.....	57	17,400	.....	402	.....	2,130

NOTE.—Daily discharge determined from a fairly well defined discharge rating curve. No correction has been made to discharge for possible backwater from ice.

Monthly discharge of Monocacy River near Frederick, Md., for 1911.

[Drainage area, 660 square miles.]

Month.	Discharge in second-feet.				Run-off, (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	3,140	154	598	0.906	1.04	B.
February	1,540	282	815	1.23	1.28	B.
March	1,880	360	825	1.25	1.44	A.
April	3,670	402	990	1.50	1.67	A.
May	789	154	293	.444	.51	A.
June	632	154	264	.400	.45	A.
July	446	57	157	.238	.27	A.
August	17,400	38	1,280	1.94	2.24	A.
September	15,200	127	1,180	1.79	2.00	A.
October	2,400	79	661	1.00	1.15	A.
November	2,960	320	865	1.31	1.46	A.
December	5,900	360	1,300	1.97	2.27	A.
The year	17,400	38	769	1.17	15.78	

GOOSE CREEK NEAR LEESBURG, VA.

Location.—At Evergreen Mills about 7 miles directly south of Leesburg (the most convenient railroad station), about 1 mile below the mouth of Little River and 10 miles above the mouth of Goose Creek.

Records available.—July 12, 1909, to December 31, 1911.

Drainage area.—338 square miles.

Gage.—Vertical staff, spiked to a tree on the left bank immediately below the tail-race of the mill.

Channel.—Fairly permanent.

Discharge measurements.—Made between the mill and the dam, either by wading or from the highway bridge. The discharge of the mill race is also measured and added to the discharge between the mill and the dam.

Artificial control.—The dam at this point is of timber and rock and at low stages most of the water passes through it. The mill race carries water at all times, three or four times more when the mill is running than when it is idle. This variation in flow causes variation in the gage heights ranging from a few hundredths to about 0.15 foot; but as the mill is run only four or five hours a day the fluctuation has a relatively small effect on the accuracy of estimates.

The following discharge measurement was made by J. G. Mathers:
October 6, 1911: Gage height, 0.94 foot; discharge, 68 second-feet.

Daily gage height, in feet, of Goose Creek near Leesburg, Va., for 1911.

[J. O. Daniel, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	Sept.	Oct.	Nov.	Dec.
1	1.55	2.6	1.6	1.6	2.1	1.0	1.2	2.05
2	1.8	2.35	1.6	1.45	2.1	1.05	1.24	2.08
3	2.6	2.2	1.6	1.45	2.2	1.1	1.28	1.96
4	2.8	2.5	1.6	1.7	3.0	1.08	1.32	1.9
5	2.0	2.0	1.4	3.45	3.5	1.05	1.3	1.85
6	2.0	1.9	1.35	2.7	4.0	1.02	1.3	1.84
7	2.0	1.8	1.35	2.4	3.0	1.03	1.4	1.5
8	1.85	1.8	1.35	2.4	2.0	1.03	1.5	1.46
9	1.8	1.75	1.4	2.3	.6	1.06	2.0	1.45
10	1.7	1.75	1.7	2.0	1.5	1.08	1.8	1.4

Daily gage height, in feet, of Goose Creek near Leesburg, Va., for 1911—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	Sept.	Oct.	Nov.	Dec.
11	1.6	1.7	2.0	2.0	1.5	1.1	1.6	1.38
12	1.05	1.75	2.6	1.9	2.0	1.08	1.5	1.4
13	1.35	1.7	2.75	1.85	2.6	1.08	3.0	1.36
14	1.9	1.7	2.5	1.85	2.6	1.06	2.8	1.3
15	1.2	1.75	2.4	1.85	2.6	1.08	2.75	1.28
16	1.3	1.7	2.2	1.7	2.5	1.1	2.9	1.35
17	1.4	1.7	2.5	1.7	2.5	1.04	2.88	1.5
18	1.35	1.65	2.5	1.65	2.25	4.0	3.0	1.6
19	1.35	1.7	2.0	1.65	2.0	3.0	3.0	1.8
20	1.2	1.7	2.0	1.65	2.0	2.0	2.8	2.0
21	1.15	1.7	2.0	1.65	1.7	1.8	2.75	2.05
22	1.15	1.7	1.9	1.65	1.0	1.65	2.5	2.3
23	1.2	1.65	1.85	1.6	1.8	1.8	2.45	3.0
24	1.5	1.65	1.7	1.6	1.1	1.85	2.4	3.2
25	1.55	1.65	1.65	1.55	1.05	1.82	2.55	3.4
26	1.55	1.65	1.65	1.4	1.05	1.78	2.2	3.5
27	1.6	1.65	1.65	1.4	1.0	1.76	2.18	4.0
28	1.6	1.65	1.8	1.4	1.0	1.74	2.0	3.8
29	2.3	.....	2.0	1.4	1.05	1.4	1.98	3.4
30	3.5	.....	2.5	1.35	1.0	1.38	2.1	3.0
31	2.9	.....	1.6	.....	.....	1.3	.....	2.8

NOTE.—There was undoubtedly backwater from ice for a considerable part of January and February. It is not known whether gage heights were to water surface or to the top of the ice.

The lower part of the gage became covered with silt during 1911 and for that reason the gage heights during May to August were too unreliable to publish. Silt was cleared away Oct. 6.

Daily discharge, in second-feet, of Goose Creek near Leesburg, Va., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	Sept.	Oct.	Nov.	Dec.
1	225	588	240	240	405	84	130	388
2	303	495	240	196	405	95	140	398
3	588	441	240	196	441	106	150	356
4	665	550	240	271	743	102	160	336
5	370	370	182	924	944	95	155	320
6	370	336	168	626	1,150	88	155	316
7	370	303	168	513	743	91	182	210
8	320	303	168	513	370	91	210	199
9	303	287	182	477	25	97	370	196
10	271	287	271	370	210	102	303	182
11	240	271	370	370	210	106	240	177
12	95	287	588	336	370	102	210	182
13	168	271	646	320	588	102	743	171
14	336	271	550	320	588	97	665	155
15	130	287	513	320	588	102	646	150
16	155	271	441	271	550	106	704	168
17	182	271	550	271	550	93	696	210
18	168	256	550	256	459	1,150	743	240
19	168	271	370	256	370	743	743	303
20	130	271	370	256	370	370	665	370
21	118	271	370	256	271	303	646	388
22	118	271	336	256	84	256	550	477
23	130	256	320	240	303	303	532	743
24	210	256	271	240	106	320	513	823
25	225	256	256	225	95	310	569	903
26	225	256	256	182	95	297	441	944
27	240	256	256	182	84	290	434	1,150
28	240	256	303	182	84	284	370	1,070
29	477	.....	370	182	95	182	363	903
30	944	.....	550	168	84	177	405	743
31	704	.....	240	.....	.....	155	.....	665

NOTE.—Daily discharge determined from a rating curve that is well defined between 50 and 1,370 second-feet. Discharge during January and February probably too high, owing to backwater from ice. No correction has been applied for this backwater.

Monthly discharge of Goose Creek near Leesburg, Va., for 1911.

[Drainage area, 338 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	944	95	296	0.876	1.01	C.
February	588	256	313	.926	.96	D.
March	646	168	341	1.01	1.16	B.
April	924	168	314	.929	1.04	B.
September	1,150	25	379	1.12	1.25	B.
October	1,150	84	219	.648	.75	B.
November	743	130	428	1.27	1.42	B.
December	1,150	150	446	1.32	1.52	B.

RAPPAHANNOCK RIVER BASIN.

RAPPAHANNOCK RIVER NEAR FREDERICKSBURG, VA.

Location.—About 3½ miles above Fredericksburg, and about 1½ miles above the dam of the Fredericksburg Power Co.

Records available.—September 19, 1907, to December 31, 1911.

Drainage area.—1,590 square miles.

Gage.—Original gage and station located at a pool a few hundred feet above a rocky control. This gage was destroyed February 14, 1908, and was replaced February 20, 1908, by a chain gage under the cable. Datum for both gages the same and unchanged.

Channel.—Probably permanent. Current sluggish at extreme low water.

Discharge measurements.—Made from car and cable.

Winter flow.—Not often affected by ice.

Accuracy.—Accurate discharge measurements at low stages are difficult. A good low-water rating curve has been developed.

Cooperation.—Established in cooperation with the Fredericksburg Power Co., by which the cable and equipment were furnished.

The following discharge measurement was made by wading about one-half mile below the cable by G. C. Stevens, assisted by Cecil L. Reid, engineer for Fredericksburg Power Co.:

July 26, 1911: Gage height, 0.70 foot; discharge, 214 second-feet.

Daily gage height, in feet, of Rappahannock River near Fredericksburg, Va., for 1911.

[J. W. Franklin, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.8	2.7	1.65	1.8	1.9	1.17	1.11	0.49	4.7	0.97	1.41	1.85
2	4.5	2.6	1.6	1.7	1.85	1.48	1.05	.51	2.8	.96	1.39	1.75
3	4.0	2.5	1.6	1.65	1.8	1.28	.97	.46	2.5	.96	1.34	1.65
4	5.8	2.35	1.55	1.65	1.7	1.12	.85	.55	3.2	1.02	1.27	1.6
5	3.8	2.25	1.55	3.2	1.65	1.05	.83	2.15	2.45	1.03	1.27	1.55
6	2.9	2.1	1.55	4.0	1.6	1.30	.77	3.0	1.8	1.01	1.30	1.5
7	2.6	2.05	1.55	3.1	1.6	1.38	.87	2.3	1.65	.99	2.9	1.5
8	2.3	2.05	1.65	2.8	1.55	1.39	.89	1.6	1.35	1.01	2.45	1.49
9	2.25	2.45	1.6	2.8	1.6	1.44	.95	1.20	1.23	1.07	2.05	1.47
10	2.05	2.6	1.95	2.8	1.6	1.28	.97	.97	2.35	1.17	2.0	1.47
11	1.9	2.3	3.1	2.7	1.55	1.24	.81	.91	2.35	1.06	1.9	1.43
12	1.85	2.1	2.45	2.4	1.5	1.26	.84	.78	2.6	1.05	1.8	1.45
13	2.0	2.05	2.1	2.3	1.43	1.36	1.19	.80	2.05	1.10	1.85	1.43
14	2.45	1.95	2.3	2.2	1.36	1.6	.95	.80	1.55	1.13	1.9	1.41
15	2.3	1.9	2.35	2.2	1.34	1.40	.85	1.29	1.35	1.01	1.9	1.47

Daily gage height, in feet, of Rappahannock River near Fredericksburg, Va., for 1911— Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16	2.1	1.85	2.25	2.25	1.34	1.17	0.77	1.19	1.33	1.03	2.2	2.5
17	1.9	1.8	2.05	2.15	1.31	1.02	.74	.95	1.33	1.06	2.0	4.0
18	1.8	1.8	2.0	2.05	1.31	1.00	.69	.84	1.31	4.3	1.95	2.6
19	1.75	1.8	2.0	2.0	1.28	.97	.62	.73	1.23	3.6	2.25	2.2
20	1.75	1.8	2.15	2.2	1.25	1.06	.65	.69	1.15	2.45	2.05	2.0
21	1.75	2.35	2.05	2.2	1.19	1.02	.54	.66	1.39	1.95	1.9	2.0
22	1.75	2.15	1.9	2.05	1.18	1.00	.62	.60	1.21	1.95	1.75	2.0
23	2.3	1.9	1.8	2.2	1.15	.91	.57	.55	1.11	2.25	1.65	5.3
24	2.25	1.85	1.75	2.4	1.18	.87	.57	.52	1.09	2.25	1.7	4.5
25	2.1	1.8	1.65	2.2	1.15	1.20	.54	.49	1.04	1.9	2.0	3.7
26	2.05	1.75	1.6	2.0	1.11	2.1	.67	.48	1.65	1.7	1.8	3.1
27	2.4	1.7	1.6	1.95	1.10	1.7	.80	.53	1.43	1.65	1.7	3.4
28	2.35	1.7	1.9	1.85	1.07	1.65	1.10	1.25	1.06	1.55	1.7	3.1
29	2.25	.....	1.85	1.85	1.04	1.75	.91	1.35	.97	1.47	2.0	2.6
30	2.9	.....	1.85	1.85	1.00	1.36	.81	1.65	.99	1.42	2.5	2.4
31	3.2	.....	1.95	.....	1.00	.....	.53	3.2	.....	1.42	.....	2.5

NOTE.—The river was frozen for brief periods during January and February, but the backwater from ice was probably inappreciable. All gage readings are probably to water surface.

Daily discharge, in second-feet, of Rappahannock River near Fredericksburg, Va., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,570	2,400	918	1,100	1,220	449	407	158	7,070	325	656	1,160
2	6,480	2,240	860	975	1,160	729	370	162	2,570	320	636	1,040
3	5,100	2,080	860	918	1,100	534	325	152	2,080	320	588	918
4	10,900	1,840	805	918	975	414	270	172	3,290	352	526	860
5	4,610	1,700	805	3,290	918	370	262	1,560	2,000	358	526	805
6	2,740	1,480	805	5,100	860	550	240	2,920	1,100	346	550	750
7	2,240	1,420	805	3,100	860	626	278	1,770	918	335	2,740	750
8	1,770	1,420	918	2,570	805	636	286	860	598	346	2,000	740
9	1,700	2,000	860	2,570	860	687	315	470	494	382	1,420	718
10	1,420	2,240	1,280	2,570	860	534	325	325	1,840	449	1,350	718
11	1,220	1,770	3,100	2,400	805	502	254	295	1,840	376	1,220	676
12	1,160	1,480	2,000	1,920	750	518	266	243	2,240	370	1,100	698
13	1,350	1,420	1,480	1,770	676	607	463	250	1,420	400	1,160	676
14	2,000	1,280	1,770	1,620	607	860	315	250	805	421	1,220	656
15	1,770	1,220	1,840	1,620	588	645	270	542	598	346	1,220	718
16	1,480	1,160	1,700	1,700	588	449	240	463	578	358	1,620	2,080
17	1,220	1,100	1,420	1,560	560	352	229	315	578	376	1,350	5,100
18	1,100	1,100	1,350	1,420	560	340	212	266	560	5,910	1,280	2,240
19	1,040	1,100	1,350	1,350	534	325	191	226	494	4,140	1,700	1,620
20	1,040	1,100	1,560	1,620	510	376	200	212	435	2,000	1,420	1,350
21	1,040	1,840	1,420	1,620	463	352	170	203	636	1,280	1,220	1,350
22	1,040	1,560	1,220	1,420	456	340	191	185	478	1,280	1,040	1,350
23	1,770	1,220	1,100	1,620	435	295	178	172	407	1,700	918	9,030
24	1,700	1,160	1,040	1,920	456	278	178	165	394	1,700	975	6,480
25	1,480	1,100	918	1,620	435	470	170	158	364	1,220	1,350	4,370
26	1,420	1,040	860	1,350	407	1,480	206	156	918	975	1,100	3,100
27	1,920	975	860	1,280	400	975	250	168	676	918	975	3,700
28	1,840	975	1,220	1,160	382	918	400	510	376	805	975	3,100
29	1,700	.....	1,160	1,160	364	1,040	295	598	325	718	1,350	2,240
30	2,740	.....	1,160	1,160	340	607	254	918	335	666	2,080	1,920
31	3,290	.....	1,280	.....	340	.....	168	3,290	.....	666	.....	2,080

NOTE.—Discharge determined from a discharge rating curve well defined below 6,000 second-feet. No correction has been made for backwater from ice.

Monthly discharge of Rappahannock River near Fredericksburg, Va., for 1911.

[Drainage area, 1,590 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	10,900	1,040	2,350	1.48	1.71	A.
February	2,409	975	1,480	.931	.97	A.
March	3,100	805	1,250	.786	.91	A.
April	5,100	918	1,810	1.14	1.27	A.
May	1,220	340	654	.411	.47	A.
June	1,480	278	575	.362	.40	A.
July	463	168	264	.166	.19	A.
August	3,290	152	585	.368	.42	A.
September	7,070	325	1,210	.761	.85	A.
October	5,910	320	973	.612	.71	A.
November	2,740	526	1,210	.761	.85	A.
December	9,030	656	2,030	1.28	1.48	A.
The year	10,900	152	1,200	.755	10.23	

MISCELLANEOUS MEASUREMENTS.

The following miscellaneous discharge measurements were made in north Atlantic coast drainage basins during 1911:

Miscellaneous measurements in north Atlantic coast drainage basins in 1911.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Mar. 8	Ware River	Chicopee River	At highway bridge, Barre station, Mass.	[a] 16.99	232
Apr. 15	West Branch of Westfield River.	Westfield River	First highway bridge above Boston & Albany R. R., Chester, Mass.	[b] 15.52	651
Sept. 21	Mianus River	Atlantic Ocean	Old gaging station near Stamford, Conn.	[c] 3.75	38
July 15	Indian River	Hudson River	Indian Lake, N. Y.	(*d*)	856
Nov. 17	Big Brook	Indian River	Highway bridge, about ½ mile below Indian Lake dam, Indian Lake, N. Y.	[e] 10.20	83
July 24	West Stony Creek	Sacandaga River	½ mile above highway bridge at mouth of creek, near Northville, N. Y.	[f] 2.56	10.9
22	East Stony Creek	do	Near Northville, N. Y., about 700 feet above highway bridge, near mouth of creek.	[g] 1.90	8.9
Aug. 21	Hoosic River	Hudson River	300 feet below highway bridge at Eagle Bridge, N. Y.	[h] 1.02	162
Jan. 30	Owlkill Creek	Hoosic River	Eagle Bridge, N. Y.	[h] 3.10	110
Mar. 15	do	do	do	[h] 3.42	219
June 16	do	do	do	[h] 2.35	16

[a] Distance to water surface from top of right side of center floor support downstream side of bridge.
[b] Distance to water surface from top of second floor beam, downstream right end of bridge.
[c] Distance to water surface from under surface of large projecting stone, second course from top in north side of west abutment.
[d] Reading on gage at dam, 29.3. One gate in 5-foot sluice pipe wide open; other gate half open.
[e] Distance to water surface from corner of top of right upstream abutment. At Indian River bridge distance from reference point to water surface, 12.60. As the gates were closed at Indian Lake dam, the discharge of Indian River at the first bridge was practically the same as Big Brook, viz, 83 second-feet. Complete ice cover at both bridges.
[f] Distance to water surface from notched brown stone, left upstream abutment.
[g] Distance to water surface from corner of concrete footing course to old, left, stone abutment.
[h] Chain gage on highway bridge at Eagle Bridge.

SUMMARY OF DISCHARGE PER SQUARE MILE.

The following summary of discharge per square mile is given to allow ready comparison of relative rates of run-off from different areas in the north Atlantic coast drainage basins. It shows in a general way the seasonal distribution of run-off and the effect of snow, ground, surface, and artificial storage; but the most important fact worth noting is the almost entire lack of uniformity or agreement between any two streams. This indicates that the discharge of each stream is a law unto itself, and that all projects dependent upon stream flow, if they are to be developed along the safest and most economical lines, must be based on records of stream flow collected with great care over a long series of years as near the location of the project under consideration as possible.

Summary of discharge, in second-feet per square mile, for stations in north Atlantic coast drainage basins for 1911.

Station.	Drainage area.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
	Sq.mi.													
St. John River near Dickey, Me.	2,820	....	....	....	....	....	1.12	0.45	0.78	0.67	0.60	....	....	....
St. John River at Fort Kent, Me.	4,880	0.16	0.12	0.13	1.24	5.31	1.16	.49	.68	.51	.47	0.48	0.34	0.93
St. John River at Van Buren, Me.	8,270	.16	.12	.13	1.56	6.47	1.60	.65	.72	.47	.43	.42	.33	1.10
Allagash River near Allagash, Me.	1,240	....	....	....	....	....	1.37	.34	.27	.36	.34	.46	....	....
St. Francis River near St. Francis, Me.	560	....	....	....	....	....	1.17	.62	.75	.39	.28	.31	....	....
Madawaska River at St. Rose du Degele, Quebec	958	....	....	....	....	....	2.52	1.13	.62	.44	.39	.34	....	....
Fish River at Wallagrass, Me.	860	....	....	....	....	....	1.33	.50	.52	.35	.22	.20	....	....
St. Croix River near Woodland, Me.	1,420	.99	1.06	.96	2.13	1.30	1.00	1.04	.99	.79	.69	.86	1.42	1.11
Machias River at Whitneyville, Me.	465	1.10	.76	1.39	3.66	2.71	3.23	.65	.37	.53	.49	.99	1.93	1.48
Green Lake Stream at Lakewood, Me.	47	.30	2.72	1.16	.93	.82	.84	1.24	2.28	2.64	1.66	.52	.42	1.28
Branch Lake Stream near Ellsworth, Me.	31	.71	.28	1.46	2.09	2.06	2.19	1.57	1.80	1.62	1.06	.77	1.00	1.39
Penobscot River at Millinocket, Me.	1,880	1.16	.76	.36	.58	1.27	1.24	1.18	1.23	1.18	1.18	1.15	1.07	1.03
Penobscot River at West Enfield, Me.	6,600	.76	.53	.59	3.05	2.44	1.27	.82	.73	.90	.77	.90	1.91	1.23
East Branch of Penobscot River at Grindstone, Me.	1,100	.41	.32	.46	2.59	3.15	1.86	.96	.48	.59	.59	.76	1.12	1.11
Mattawamkeag River at Mattawamkeag, Me.	1,500	.73	.53	.80	4.35	3.03	1.27	.22	.30	.54	.59	.99	2.81	1.35
Piscataquis River at Foxcroft, Me.	286	.52	.42	.87	8.04	3.41	.67	.18	.21	.20	.44	1.87	3.64	1.71
Kenduskeag Stream near Bangor, Me.	191	2.39	.91	2.54	9.32	1.59	.62	.33	.45	.42	.61	1.24	4.32	2.06
Moose River at Rockwood, Me.	680	.26	.19	.21	1.16	4.66	1.31	.95	.66	.84	1.12	1.01	1.57	1.17
Kennebec River at The Forks, Me.	1,570	.82	.57	.48	.58	1.66	1.93	1.48	1.46	1.09	.62	.31	.59	.97
Kennebec River at Waterville, Me.	4,270	.47	.32	.33	2.81	1.82	1.00	.68	.76	.66	.62	.69	1.06	.94
Dead River at The Forks, Me.	878	.25	.19	.20	1.93	4.62	1.30	.46	.54	.56	.87	.77	1.53	1.11
Sebasticook River at Pittsfield, Me.	320	.41	.38	.41	4.34	1.45	.68	.53	.51	.42	.48	.80	1.70	1.01
Cobbosseecontee Stream at Gardiner, Me.	240	.52	.62	.64	1.66	.97	.94	.69	.72	.72	.58	.42	.44	.74
Androscoggin River at Errol dam, N. H.	1,095	.79	.66	.65	1.05	1.95	.70	.98	.89	.82	.89	.82	1.09	.94
Androscoggin River at Rumford Falls, Me.	2,090	.69	.46	.38	2.43	2.40	.86	.66	.69	.74	.97	1.07	1.27	1.05
Presumpscot River at outlet of Sebago Lake, Me.	436	.71	.86	.72	.66	.71	.73	.49	.36	.63	.72	1.12	.88	.72
Saco River at West Buxton, Me.	1,550	.92	.57	.64	4.28	3.52	1.21	.58	.41	.37	.73	1.08	1.39	1.31
Pemigewassett River at Plymouth, N. H.	615	.85	.53	1.79	9.20	4.13	1.17	.42	.56	.94	2.24	1.82	2.41	2.18
Merrimac River at Franklin Junction, N. H.	1,460	.97	.68	1.08	4.87	2.77	1.09	.66	.75	1.01	1.88	1.71	1.82	1.61
Merrimac River at Garvins Falls, N. H.	2,340	.90	.56	1.05	4.27	2.04	.83	.47	.53	.68	1.38	1.41	1.20	1.28
Merrimac River at Lawrence, Mass.	4,452	.62	.48	1.25	3.04	1.36	.55	.27	.33	.44	.92	1.05	1.28	.97
Souhegan River at Merrimac, N. H.	168	.77	.30	2.67	3.08	.89	.79	.20	.23	.34	1.67	1.99	2.42	1.29
South Branch of Nashua River at Clinton Mass.	118.19	1.20	.97	2.07	2.16	.71	.54	.09	.29	.28	1.11	1.60	1.65	1.06
Sudbury River at Framingham, Mass [a]	75.2	.80	1.08	1.77	2.21	.49	.33	.02	.03	.12	.46	.92	1.40	.80
Lake Cochituate at Cochituate, Mass [a]	17.58	.77	1.17	1.74	1.94	.25	.12	.05	.49	.55	.79	1.07	1.56	.87

[a] Attention is called to the fact that the Sudbury River records do not give the actual run-off of the river (which would include the effect of storage in the wet season and draft from storage in the dry season from the tributary reservoirs and streams as well as the loss by evaporation from them), but the natural flow of the basin without storage, as nearly as this flow can be measured and adjusted for the change in volume of stored water, without, however, taking into account the actual loss of water by evaporation from the water surfaces of the existing reservoirs and streams in this drainage basin. It may be said that this method of figuring the yield is common for waterworks or public supplies, and is used also in the Nashua and Croton records, but for streams utilized chiefly for production of power the effect of storage as well as the loss by evaporation is included in the yield or run-off measurements and records.

Summary of discharge, in second-feet per square mile, for stations in north Atlantic coast drainage basins for 1911—Continued.

Station.	Drainage area.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
	Sq.mi.													
Connecticut River at Orford, N. H	3,300	0.76	0.41	0.74	5.09	3.42	0.74	0.36	0.49	0.72	1.31	1.32	2.50	1.49
Connecticut River at Sunderland, Mass.	7,700	1.30	.54	1.16	4.73	2.55	.79	.29	.37	.71	2.12	1.64	2.34	1.55
Passumpsic River near St. Johnsbury, Vt	237	.80	.42	.78	5.78	2.62	.84	.57	.63	.84	1.21	1.38	2.38	1.52
White River near Sharon, Vt	686	1.30	.51	1.09	5.50	1.79	.55	.36	.49	.82	2.22	1.57	2.11	1.53
Deerfield River at Shelburne Falls, Mass.	501	1.99	.60	1.89	6.45	1.97	1.55	.30	.47	1.33	4.25	2.36	2.20	2.12
Westfield River at Knightville, Mass	162	1.28	.75	1.60	4.04	1.46	1.63	.25	.41	.57	2.93	2.73	2.52	1.69
Middle Branch of Westfield River at Goss Heights, Mass	53	2.53	.66	2.66	4.49	1.82	1.76	.31	.50	.91	4.36	2.94	3.00	2.17
Hudson River at North Creek, N. Y	807	.93	.85	.84	4.42	3.25	1.52	.88	.98	.65	1.14	1.25	2.29	1.59
Hudson River at Thurman, N. Y	1,550	.77	.64	.81	4.52	2.83	1.21	.60	.56	.46	.84	1.01	1.81	1.34
Hudson River at Corinth, N. Y	2,730	.97	.75	1.02	5.38	3.21	1.72	.55	.58	.78	2.05	2.08	3.18	1.85
Hudson River at Mechanicville, N. Y	4,500	1.17	.75	1.28	3.73	2.06	.98	.30	.26	.44	1.61	1.68	2.22	1.38
Schroon River at Riverbank, N. Y	534	.67	.47	.58	3.99	2.66	1.17	.35	.19	.28	.62	1.14	1.99	1.18
Sacandaga River at Wells, N. Y	263	.91	.65	.94	5.89	5.06	2.26	.25	.13	....	....	....	....	....
Sacandaga River at Hadley, N. Y	1,050	.98	.70	1.19	5.64	2.79	1.40	.28	.19	.63	2.55	2.55	3.54	1.88
Schoharie River at Prattsville, N. Y	240	2.70	.85	2.41	4.43	1.19	2.00	.17	.14	.59	2.56	1.52	2.50	1.76
Esopus Creek near Olivebridge, N. Y	239	2.42	1.46	2.29	4.18	1.41	2.11	.54	.37	.67	3.80	2.42	2.21	1.99
Esopus Creek at Mount Marion, N. Y	378	2.07	1.44	2.52	3.98	1.07	2.17	.51	.40	.71	3.99	2.48	2.18	1.97
Rondout Creek at Rosendale, N. Y	380	2.29	.96	3.29	4.44	1.14	2.16	.43	.27	.83	4.65	2.73	2.64	2.16
Passaic River near Chatham, N. J	101	1.51	.96	.94	1.47	.12	.90	.21	.19	.50	1.19	.86	.81	.80
East Branch of Delaware River at Hancock, N. Y	920	2.81	.71	2.47	5.14	1.08	2.37	.33	.27	.73	2.33	2.27	2.25	1.90
Delaware River at Port Jervis, N. Y	3,250	2.26	.78	2.30	4.22	.94	2.03	.35	.28	.66	2.11	1.76	1.99	1.64
Delaware River at Riegelsville, N. J	6,430	1.98	.98	2.02	3.56	1.07	2.05	.61	.53	1.19	2.41	1.91	1.94	1.70
West Branch of Delaware River at Hancock, N. Y	680	2.74	.66	2.13	3.68	.62	1.50	.26	.24	.54	1.39	1.51	1.74	1.42
Mongaup River at Rio, N. Y	189	2.12	.79	2.73	4.13	1.12	2.61	.56	.44	.53	2.22	2.00	2.49	1.81
Lehigh River at South Bethlehem, Pa	1,235	2.31	1.25	1.61	2.76	1.09	2.11	.87	1.00	1.94	2.70	1.98	1.96	1.80
Tohickon River at Point Pleasant, Pa	102	2.75	1.36	2.74	2.23	.26	.68	.72	.98	1.08	3.20	3.31	2.63	1.83
Neshaminy River below Forks, Pa	139	2.69	1.89	1.70	1.89	.46	.27	.12	1.58	1.18	2.09	3.06	2.14	1.59
Schuylkill River near Philadelphia, Pa	1,920	1.19	.70	.73	1.33	.42	.72	.54	.71	1.21	1.96	1.82	1.65	1.08
Perkiomen Creek near Frederick, Pa	152	1.91	1.47	1.74	1.98	.50	1.17	.73	.78	.83	2.18	2.34	1.88	1.46
Susquehanna River at Binghamton, N. Y	2,400	2.88	.60	2.62	4.03	.68	1.13	.29	.17	.42	1.11	1.49	2.11	1.47
Susquehanna River at Wilkes-Barre, Pa	9,810	2.12	.77	2.20	3.11	.61	.72	.18	.13	.37	.94	.92	1.46	1.13
Susquehanna River at Danville, Pa	11,100	2.13	.82	2.14	3.07	.69	.78	.23	.21	.53	1.14	1.05	1.53	1.20
Susquehanna River at Harrisburg, Pa	24,000	2.18	1.18	1.80	3.05	.80	.68	.27	.34	1.28	1.78	1.20	1.72	1.35
Chenango River at Binghamton, N. Y	1,530	2.88	.76	3.14	4.52	.86	.93	.24	.24	.55	1.00	1.32	2.04	1.54
West Branch of Susquehanna River at Williamsport, Pa	5,640	3.05	2.02	2.38	3.95	1.40	1.22	.52	.80	2.32	3.67	1.95	2.80	2.18
Juniata River at Newport, Pa	3,480	2.04	1.38	1.21	2.34	.71	.48	.29	.42	1.93	1.58	1.07	1.48	1.24
Potomac River at Point of Rocks, Md	9,650	1.26	1.17	1.00	1.56	.45	.38	.22	.25	1.31	.88	.62	1.06	.84
Monocacy River near Frederick, Md	660	.91	1.23	1.25	1.50	.44	.40	.24	1.94	1.79	1.00	1.31	1.97	1.17
Goose Creek near Leesburg, Va	338	.88	.93	1.01	.93	....	....	....	....	1.12	.65	1.27	1.32	....
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DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, DIRECTOR

WATER-SUPPLY PAPER 302

SURFACE WATER SUPPLY OF THE UNITED STATES

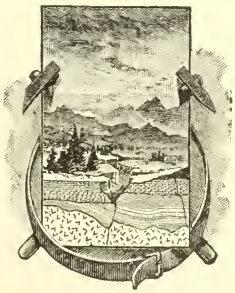
1911

PART II. SOUTH ATLANTIC COAST AND EASTERN GULF OF MEXICO DRAINAGE BASINS

PREPARED UNDER THE DIRECTION OF M. O. LEIGHTON

BY

M. R. HALL AND C. H. PIERCE



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SURFACE WATER SUPPLY OF THE SOUTH ATLANTIC COAST AND EASTERN GULF OF MEXICO DRAINAGE BASINS, 1911.

By M. R. Hall and C. H. Pierce.

AUTHORITY FOR THE WORK.

This volume is Part II of a series of 12 reports presenting results of measurements of flow made on certain streams in the United States during the calendar year 1911. The reports are listed in the following table:

Papers on surface water supply of the United States, 1911.

Part.[a]	No.	Title.
I	301	North Atlantic coast.
II	302	South Atlantic coast and eastern Gulf of Mexico.
III	303	Ohio River basin.
IV	304	St. Lawrence River basin.
V	305	Upper Mississippi River and Hudson Bay basins.
VI	306	Missouri River basin.
VII	307	Lower Mississippi River basin.
VIII	308	Western Gulf of Mexico.
IX	309	Colorado River basin.
X	310	Great Basin.
XI	311	Pacific coast in California.
XII	312	North Pacific coast.

[a] For the purpose of uniformity in the presentation of reports, a general plan has been agreed upon by the United States Reclamation Service, the United States Forest Service, the United States Weather Bureau, and the United States Geological Survey, according to which the area of the United States has been divided into 12 parts, whose boundaries coincide with natural drainage lines indicated by the parts of the report.

The data presented in these reports were collected by the United States Geological Survey under authority implied in the organic law (20 Stat. L., p. 394), which contains the following paragraph:

Provided, That this officer [the Director] shall have the direction of the geological survey and the classification of public lands and examination of the geological structure, mineral resources, and products of the national domain.

The work was begun in 1888 in connection with special studies of water supply for irrigation.

Since the fiscal year ending June 30, 1895, successive sundry civil bills passed by Congress have carried the following item and appropriations:

For gaging the streams and determining the water supply of the United States and for the investigation of underground currents and artesian wells and for the preparation of reports upon the best methods of utilizing the water resources.

Annual appropriations for the fiscal year ending June 30—

1895	$12,500
1896	20,000
1897 to 1900, inclusive	50,000
1901 to 1902, inclusive	100,000
1903 to 1906, inclusive	200,000
1907	150,000
1908 to 1910, inclusive	100,000
1911 to 1913, inclusive	150,000

In the execution of the work many private and State organizations have cooperated. Acknowledgments for such cooperation are made on page 13 and also in connection with the description of each station affected by the cooperative work.

PUBLICATIONS.

Measurements of stream flow have been made at nearly 2,000 points in the United States and also at many points in small areas in Seward Peninsula and the Yukon-Tanana region, Alaska, and in the Hawaiian Islands. During 1911 gaging stations were maintained by the Survey and the cooperating organizations at about 1,500 points in the United States, and many discharge measurements were made at other points. In connection with this work data were also collected in regard to precipitation, evaporation, storage reservoirs, river profiles, and water power in many sections of the country, and will be made available in the regular surface water supply papers from time to time. A complete list of the gaging stations maintained by the Survey to and including 1910, and a list of the papers relating to the water supply of the country, have been published by the Survey as Water-Supply Paper 280. An index to the reports containing stream-flow measurements prior to 1904 has been published as Water-Supply Paper 119.

For each calendar year there has been prepared a report embodying the stream-flow data collected during that year, which has been published either as a part of the annual report of the Director, as a bulletin, or as a water-supply paper, as shown by the following table:

Stream-flow data in reports of the United States Geological Survey.

[A=Annual Report; B=Bulletin; WS=Water-Supply Paper.]

Report.	Character of data.	Year.
10th A, pt. 2	Descriptive information only	
11th A, pt. 2	Monthly discharge	1884 to Sept., 1890.
12th A, pt. 2	do	1884 to June 30, 1891.
13th A, pt. 3	Mean discharge in second-feet	1884 to Dec. 31, 1892.
14th A, pt. 2	Monthly discharge (long-time records, 1871 to 1893)	1888 to Dec. 31, 1893.
B 131	Descriptions, measurements, gage heights, and ratings	1893 and 1894.
16th A, pt. 2	Descriptive information only	
B 140	Descriptions, measurements, gage heights, ratings, and monthly discharge (also many data covering earlier years).	1895.
WS 11	Gage heights (also gage heights for earlier years)	1896.
18th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also similar data for some earlier years).	1895 and 1896.
WS 15	Descriptions, measurements, and gage heights, eastern United States, eastern Mississippi River, and Missouri River above junction with Kansas.	1897.
WS 16	Descriptions, measurements, and gage heights, western Mississippi River below junction of Missouri and Platte, and western United States.	1897.
19th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also some long-time records).	1897.
WS 27	Measurements, ratings, and gage heights, eastern United States, eastern Mississippi River, and Missouri River.	1898.
WS 28	Measurements, ratings, and gage heights, Arkansas River and western United States.	1898.
20th A, pt. 4	Monthly discharge (also for many earlier years)	1898.
WS 35 to 39	Descriptions, measurements, gage heights, and ratings	1899.
21st A, pt. 4	Monthly discharge	1899.
WS 47 to 52	Descriptions, measurements, gage heights, and ratings	1900.
22d A, pt. 4	Monthly discharge	1900.
WS 65, 66	Descriptions, measurements, gage heights, and ratings	1901.
WS 75	Monthly discharge	1901.
WS 82 to 85	Complete data	1902.
WS 97 to 100	do	1903.
WS 124 to 135	do	1904.
WS 165 to 178	do	1905.
WS 201 to 214	Complete data, except descriptions	1906.
WS 241 to 252	Complete data	1907–8.
WS 261 to 272	do	1909.
WS 281 to 292	do	1910.
WS 301 to 312	do	1911.

NOTE.—No data regarding stream flow are given in the 15th and 17th annual reports.

The table which follows gives, by years and drainage basins, the numbers of the papers on surface water supply published from 1899 to 1911. The data for any particular station will be found in the reports covering the years during which the station was maintained. For example, data for Machias River at Whitneyville, Me., 1903 to 1911, are published in Water-Supply Papers 97, 124, 165, 201, 241, 261, 281, and 301, which contain records for the New England streams from 1903 to 1911.

Numbers of water-supply papers containing results of stream measurements, 1899–1911

	1899 [a]	1900 [b]	1901	1902	1903	1904
North Atlantic coast (St. John River to York River)	35	47, [c] 48	65, 75	82	97	[d] 124, [e] 125, [f] 126
South Atlantic coast and eastern Gulf of Mexico (James River to the Mississippi)	[g] 35, 36	48	65, 75	[g] 82, 83	[g] 97, 98	[f] 126, 127
Ohio River basin	36	48, [h] 49	65, 75	83	98	128
St. Lawrence River and Great Lakes	36	49	65, 75	[i] 82, 83	97	129
Hudson Bay and upper Mississippi River	36	49	[j] 65, 66, 75	[j] 83, 85	[j] 98, 99, [k] 100	[j] 128, 130
Missouri River	[l] 36, 37	49, [m] 50	66, 75	84	99	130, [n] 131
Lower Mississippi River	37	50	[j] 65, 66, 75	[j] 83, 84	[j] 98, 99	[j] 128, 131
Western Gulf of Mexico	37	50	66, 75	84	99	132
Colorado River	[o] 37, 38	50	66, 75	85	100	133
Great Basin	38, [p] 39	51	66, 75	85	100	133, [q] 134
Pacific coast in California	38, [r] 39	51	66, 75	85	100	134
North Pacific coast	38	51	66, 75	85	100	135

	1905	1906	1907–8	1909	1910	1911
North Atlantic coast (St. John River to York River)	[d] 165, [e] 166, [f] 167	[d] 201, [e] 202, [f] 203	241	261	281	301
South Atlantic coast and eastern Gulf of Mexico (James River to the Mississippi)	[f] 167, 168	[f] 203, 204	242	262	282	302
Ohio River basin	169	205	243	263	283	303
St. Lawrence River and Great Lakes	170	206	244	264	284	304
Hudson Bay and upper Mississippi River	171	207	245	265	285	305
Missouri River	172	208	246	266	286	306
Lower Mississippi River	[j] 169, 173	[j] 205, 209	247	267	287	307
Western Gulf of Mexico	174	210	248	268	288	308
Colorado River	175, [s] 177	211	249	269	289	309
Great Basin	176, [q] 177	212, [q] 213	250, [q] 251	270, [q] 271	290	310
Pacific coast in California	177	213	251	271	291	311
North Pacific coast	[t] 177, 178	214	252	272	292	312

[a] Rating tables and index to Water-Supply Papers 35–39 continued in Water-Supply Paper 39.
[b] Rating tables and index to Water-Supply Papers 47–52 and data on precipitation, wells, and irrigation in California and Utah contained in Water-Supply Paper 52.
[c] Wissahickon and Schuylkill rivers to James River.
[d] New England rivers only.
[e] Hudson River to Delaware River, inclusive.
[f] Susquehanna River to Yadkin River, inclusive.
[g] James River only.
[h] Scioto River.
[i] Lake Ontario and tributaries to St. Lawrence River proper.
[j] Tributaries of Mississippi from east.
[k] Hudson Bay only.
[l] Gallatin River.
[m] Loup and Platte rivers near Columbus, Nebr., and all tributaries below junction with Platte.
[n] Platte and Kansas rivers.
[o] Green and Gunnison rivers and Grand River above junction with Gunnison.
[p] Mohave River only.
[q] Great Basin in California, excepting Truckee and Carson drainage basins.
[r] Kings and Kern rivers and south Pacific coast drainage basins.
[s] Below junction with Gila.
[t] Rogue, Umpqua, and Siletz rivers only.

DEFINITION OF TERMS.

The volume of water flowing in a stream—the "run-off" or "discharge"—is expressed in various terms, each of which has become associated with a certain class of work. These terms may be divided into two groups—(1) those which represent a rate of flow, as second-feet, gallons per minute, miner's inches, and discharge in second-feet per square mile, and (2) those which represent the actual quantity of water, as run-off in depth in inches and acre-feet. The units used in this series of reports are second-feet, second-feet per square mile, run-off depth in inches, and acre-feet. They may be defined as follows:

"Second-foot" is an abbreviation for cubic foot per second and is the unit for the rate of discharge of water flowing in a stream 1 foot wide, 1 foot deep, at a rate of 1 foot per second. It is generally used as a fundamental unit from which others are computed by the use of the factors given in the following table of equivalents.

"Second-feet per square mile" is the average number of cubic feet of water flowing per second from each square mile of area drained, on the assumption that the run-off is distributed uniformly both as regards time and area.

"Run-off, depth in inches," is the depth to which the drainage area would be covered if all the water flowing from it in a given period were conserved and uniformly distributed on the surface. It is used for comparing run-off with rainfall, which is usually expressed in depth in inches.

An "acre-foot" is equivalent to 43,560 cubic feet and is the quantity required to cover an acre to the depth of 1 foot. The term is commonly used in connection with storage for irrigation work.

CONVENIENT EQUIVALENTS.

The following is a list of convenient equivalents for use in hydraulic computations:

Table for converting discharge in second-feet per square mile into run-off in depth in inches over the area.

Discharge in second-feet per square mile.	Run-off in inches.				
	1 day.	28 days.	29 days.	30 days.	31 days.
	0.03719	1.041	1.079	1.116	1.153
	.07438	2.083	2.157	2.231	2.306
	.11157	3.124	3.236	3.347	3.459
	.14876	4.165	4.314	4.463	4.612
	.18595	5.207	5.393	5.578	5,764
	.22314	6.248	6.471	6.694	6.917
	.26033	7.289	7.550	7.810	8.070
	.29752	8.331	8.628	8.926	9.223
	.33471	9.372	9.707	10.041	10.376

NOTE.—For partial month multiply the values for one day by the number of days.

Table for converting discharge in second-feet into run-off in acre-feet.

Discharge in second-feet.	Run-off in acre-feet.				
	1 day.	28 days.	29 days.	30 days.	31 days.
	1.983	55.54	57.52	59.50	61.49
	3.967	111.1	115.0	119.0	123.0
	5.950	166.6	172.6	178.5	184.5
	7.934	222.1	230.1	238.0	246.0
	9.917	277.7	287.6	297.5	307.4
	11.90	333.2	345.1	357.0	368.9
	13.88	388.8	402.6	416.5	430.4
	15.87	444.3	460.2	476.0	491.9
	17.85	499.8	517.7	535.5	553.4

NOTE.—For partial month multiply the values for one day by the number of days.

1 second-foot equals 40 California miner's inches (law of Mar. 23, 1901).
1 second-foot equals 38.4 Colorado miner's inches.
1 second-foot equals 40 Arizona miner's inches.
1 second-foot equals 7.48 United States gallons per second; equals 448.8 gallons per minute; equals 646,317 gallons for one day.
1 second-foot for one year covers 1 square mile 1.131 feet or 13.572 inches deep.
1 second-foot for one year equals 31,536,000 cubic feet.
1 second-foot equals about 1 acre-inch per hour.
1 second-foot for one day equals 86,400 cubic feet.
1,000,000,000 (1 United States billion) cubic feet equals 11,570 second-feet for 1 day.
1,000,000,000 cubic feet equals 414 second-feet for one 28-day month.
1,000,000,000 cubic feet equals 399 second-feet for one 29-day month.
1,000,000,000 cubic feet equals 386 second-feet for one 30-day month.
1,000,000,000 cubic feet equals 373 second-feet for one 31-day month.
100 California miner's inches equals 18.7 United States gallons per second.
100 California miner's inches for one day equals 4.96 acre-feet.
100 Colorado miner's inches equals 2.60 second-feet.
100 Colorado miner's inches equals 19.5 United States gallons per second.
100 Colorado miner's inches for one day equals 5.17 acre-feet.
100 United States gallons per minute equals 0.223 second-foot.
100 United States gallons per minute for one day equals 0.442 acre-foot.
1,000,000 United States gallons per day equals 1.55 second-feet.
1,000,000 United States gallons equals 3.07 acre-feet.
1,000,000 cubic feet equals 22.95 acre-feet.
1 acre-foot equals 325,850 gallons.
1 inch deep on 1 square mile equals 2,323,200 cubic feet.
1 inch deep on 1 square mile equals 0.0737 second-foot per year.
1 foot equals 0.3048 meter.
1 mile equals 1.60935 kilometers.
1 mile equals 5,280 feet.
1 acre equals 0.4047 hectare.
1 acre equals 43,560 square feet.
1 acre equals 209 feet square, nearly.
1 square mile equals 2.59 square kilometers.
1 cubic foot equals 0.0283 cubic meter.
1 cubic foot of water weighs 62.5 pounds.
1 cubic meter per minute equals 0.5886 second-foot.
1 horsepower equals 550 foot-pounds per second.
1 horsepower equals 76.0 kilogram-meters per second.
1 horsepower equals 746 watts.
1 horsepower equals 1 second-foot falling 8.80 feet.
1⅓ horsepower equals about 1 kilowatt.

To calculate water power quickly: $\frac{\text{Sec.-ft.} \times \text{fall in feet}}{11}$ = net horsepower on water wheel realizing 80 per cent of theoretical power.

EXPLANATION OF DATA.

For each regular current-meter gaging station the following data, so far as available, are given: Description of the station, list of discharge measurements, table of daily gage heights, table of daily discharge, table of monthly and yearly discharges and run-off. For stations located at weirs or dams the gage-height table is omitted.

In addition to statements regarding the location and installation of current-meter stations, the descriptions give information in regard to any conditions that may affect the constancy of the relation of gage height to discharge, covering such points as ice, logging, shifting channels, and backwater; also information regarding diversions which decrease the total flow at the measuring section. Statements are also made regarding the accuracy and reliability of the data.

The table of daily gage heights records the daily fluctuations of the surface of the river as found from the mean of the gage readings taken each day, usually in the morning and in the evening. The gage height given in the table represents the elevation of the surface of the water above the zero of the gage. All gage heights affected by the presence of ice in the streams or by backwater from obstructions are published as recorded, with suitable footnotes. The rating table is not applicable for such periods unless the proper corrections to the gage heights are known and applied. Attention is called to the fact that the zero of the gage is placed at an arbitrary datum and has no relation to zero flow or the bottom of the river. In general the zero is located somewhat below the lowest known flow, so that negative readings shall not occur.

The discharge measurements and gage heights are the base data from which rating tables, daily discharge tables, and monthly discharge tables are computed.

The rating table gives, either directly or by interpolation, the discharge in second-feet corresponding to every stage of the river recorded during the period for which it is applicable. It is not published in this report, but can be determined from the tables of daily gage heights and daily discharge, as follows:

First plot the discharge measurements for the current and earlier years on cross-section paper, with gage heights in feet as ordinates and discharge in second-feet as abscissas. Then tabulate a number of gage heights taken from the daily gage-height table for the complete range of stage given and the corresponding discharges for the days selected from the daily discharge table and plot the values on cross-section paper. The last points plotted will define the rating curve used and will lie among the plotted discharge measurements. After drawing the rating curve a table can be developed by scaling off the discharge in second-feet for each tenth foot of gage height. These values should be so adjusted that the first differences shall always be increasing or constant, except for known backwater periods.

The table of daily discharges gives the discharges in second-feet corresponding to the observed gage heights as determined from the rating tables.

In the table of monthly discharge the column headed "Maximum" gives the mean flow, as determined from the rating table, for the

day when the mean gage height was highest. As the gage height is the mean for the day, it does not indicate correctly the stage when the water surface was at crest height, and the corresponding discharge was consequently larger than given in the maximum column. Likewise in the column of "Minimum" the quantity given is the mean flow for the day when the mean gage height was lowest. The column headed "Mean" is the average flow in cubic feet for each second during the month. On this the computations for the remaining columns, which are defined on pages 8–9, are based.

The field methods used in the collection of the data presented in this series of reports are described in the introductory sections of Water-Supply Papers 261 to 272, inclusive, "Surface water supply of the United States, 1909." Plates I and II show the average precipitation and run-off in the United States, as determined from the measurements of stream flow made by the Geological Survey and records of rainfall collected by the Weather Bureau. Plate III shows typical gaging stations. Plate IV shows current meters[1] used in the work.

ACCURACY AND RELIABILITY OF FIELD DATA AND COMPARATIVE RESULTS.

The accuracy of stream-flow data depends primarily on the natural conditions at the gaging station and on the methods and care with which the data are collected. Errors of the first group depend on the degree of permanency of channel and of permanency of the relation between discharge and stage.

Errors of the second class are due, first, to errors in observation of stage; second, to errors in measurements of flow; and, third, to errors due to misinterpretation of stage and flow data.

In order to give engineers and others information regarding the probable accuracy of the computed results, footnotes are added to the daily-discharge tables, stating the probable accuracy of the rating tables used, and an accuracy column is inserted in the monthly discharge table. For the rating tables "well defined" indicates, in general, that the rating is probably accurate within 5 per cent; "fairly well defined," within 10 per cent; "poorly defined" or "approximate" within 15 to 25 per cent. These notes are very general and are based on the plotting of the individual measurements with reference to the mean rating curve.

The accuracy column in the monthly discharge table does not apply to the maximum or minimum nor to any individual day, but to the monthly mean. It is based on the accuracy of the rating, the probable reliability of the observer, and knowledge of local conditions. In this column A indicates that the mean monthly flow is

[1] See Hoyt, J. C., and others, Use and care of current meter as practiced by the United States Geological Survey: Trans. Am. Soc. Civil Eng., vol. 66, 1910, p. 70.

MAP OF UNITED STATES, SHOWING MEAN ANNUAL PRECIPITATION

Blue lines and figures indicate average annual precipitation in depth in inches

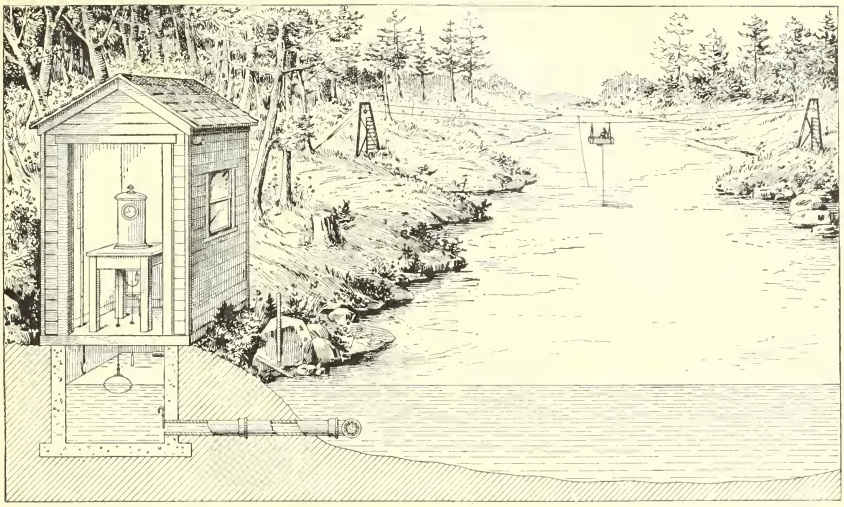
Prepared by Henry Gannett
mainly from data of the
United States Geological Survey
and United States Weather Bureau

ENGRAVED AND PRINTED BY THE U. S. GEOLOGICAL SURVEY

MAP OF UNITED STATES, SHOWING MEAN ANNUAL RUN-OFF

Blue lines and figures indicate average annual run-off in depth in inches

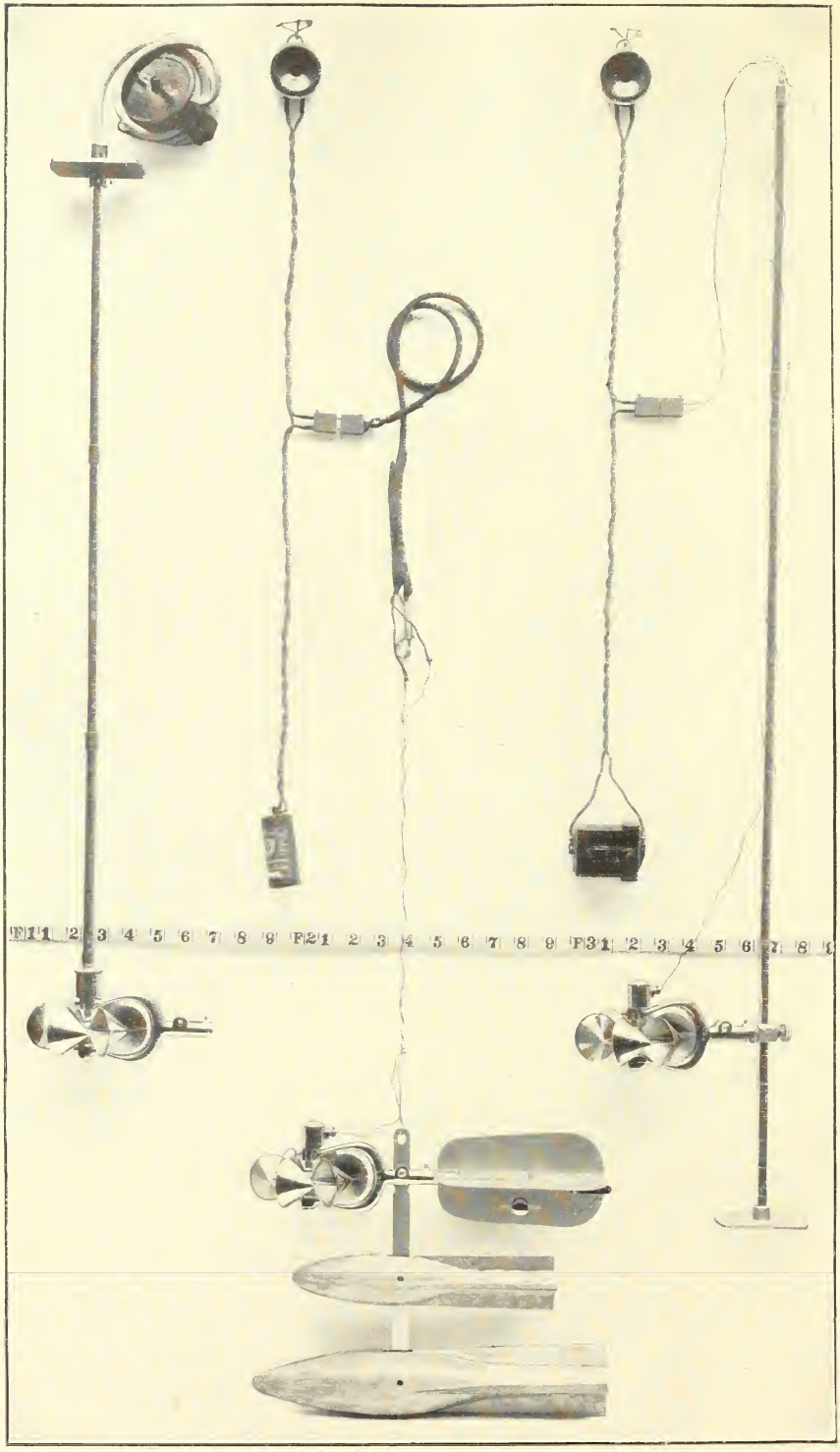
Prepared by Henry Gannett
mainly from data of the
United States Geological Survey



A. CABLE STATION WITH AUTOMATIC GAGE.

B. FOR BRIDGE MEASUREMENT.

TYPICAL GAGING STATIONS.



SMALL PRICE CURRENT METERS.

probably accurate within 5 per cent; B, within 10 per cent; C, within 15 per cent; D, within 25 per cent. Special conditions are covered by footnotes.

Even though the monthly means for any station may represent with a high degree of accuracy the quantity of water flowing past the gage, the figures showing discharge per square mile and depth of run-off in inches may be subject to gross errors which result from including in the measured drainage area large noncontributing districts or omitting estimates of water diverted for irrigation or other use, and they should therefore be considered as only approximate, particularly for periods of irrigation or of low water. For these errors it is as a rule not feasible to make adequate correction.

In general, the base data collected each year by the Survey engineers are published, not only to comply with the law, but to afford any engineer the means of examining and adjusting to his own needs the results of the computations. The table of monthly discharge is so arranged as to give only a general idea of the flow at the station and should not be used for other than preliminary estimates. The determinations of daily discharge allow more detailed studies of the variation in flow by which the period of deficiency may be determined.

It should be borne in mind that the observations in each succeeding year may be expected to throw new light on data already collected and published, and the engineer who makes use of the figures presented in these papers should verify all ratings and make such adjustments for earlier years as may seem necessary.

COOPERATION AND ACKNOWLEDGMENTS.

Special acknowledgments are due for assistance rendered or records furnished by the United States Engineer Corps, United States Weather Bureau, North Georgia Electric Co., Central Georgia Power Co., Geological Survey of Alabama, Wilson Aluminum Co., Roanoke Railway & Electric Co., Rockingham Power Co., Northern Contracting Co., and North Carolina Electric & Power Co.

DIVISION OF WORK.

The field data in the James and Roanoke drainage basins were collected under the direction of R. H. Bolster, hydraulic engineer, assisted by H. J. Jackson, J. G. Mathers, and H. J. Dean.

The field data for all drainage basins south of Roanoke River were collected by M. R. Hall, district engineer, assisted by R. E. Robertson.

The ratings, special estimates, and studies of the completed data were made by M. R. Hall, C. H. Pierce, and A. H. Tuttle.

The computations were made and the data were prepared for publication by C. H. Pierce, A. H. Tuttle, J. G. Mathers, H. J. Dean, C. L. Batchelder, W. R. King, M. I. Walters, and G. A. Wallace.

The report was edited by Mrs. B. D. Wood.

SOUTH ATLANTIC COAST DRAINAGE BASINS.

JAMES RIVER BASIN.

JAMES RIVER AT BUCHANAN, VA.

Location.—At the highway bridge near the Chesapeake & Ohio Railway depot at Buchanan, Va.

Records available.—August 18, 1895, to December 31, 1911.

Drainage area.—2,060 square miles.

Gage.—A chain gage, attached to the highway bridge, was installed November 21, 1903, to replace the original wire gage read from August 18, 1895, to that date. The datum of the gage was lowered 2 feet April 3, 1897, to avoid negative readings; subsequently the datum of the gage has remained constant.

Channel.—The bed of the river under the bridge is composed of rock overlain with a heavy deposit of mud. There is a rock control several hundred feet below the station.

Discharge measurements.—Made from the downstream side of two-span highway bridge.

Winter flow.—Occasionally affected by ice for short periods.

Accuracy.—Rating curve well developed. Published data considered good.

Cooperation.—Previous to July 15, 1906, the observations of daily gage height were made by employees of the Geological Survey; since that time gage height records have been furnished by the United States Weather Bureau.

The following discharge measurement was made by Mathers and Dean:
July 28, 1911: Gage height, 1.88 feet; discharge, 421 second-feet.

Daily gage height, in feet, of James River, at Buchanan, Va., for 1911.

[D. D. Booze, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.0	7.5	3.0	5.2	3.6	2.5	2.1	1.8	4.8	2.0	2.6	3.0
2	6.6	5.6	3.0	5.0	3.6	2.5	2.1	1.8	4.4	2.0	2.5	2.9
3	9.0	4.8	3.0	5.0	3.5	2.4	2.1	1.8	3.4	2.1	2.4	2.8
4	11.0	4.0	3.0	5.9	3.4	2.4	2.1	1.8	2.9	2.1	2.4	2.7
5	6.7	3.8	2.9	8.0	3.3	2.5	2.1	1.9	2.7	2.1	2.3	2.7
6	5.7	3.5	2.9	9.6	3.2	2.5	2.1	2.2	2.5	2.1	2.3	2.6
7	4.5	3.3	6.5	8.2	3.2	3.1	2.1	2.2	2.3	2.0	3.9	2.6
8	3.9	4.3	5.1	8.2	3.1	3.2	2.7	2.0	2.3	2.0	3.7	2.6
9	3.6	4.6	4.3	8.0	3.1	3.0	2.7	2.0	2.2	2.0	4.5	2.5
10	3.3	5.2	5.5	7.8	3.0	2.9	2.5	1.9	2.2	2.0	4.0	2.5
11	3.1	5.1	7.0	7.6	3.0	2.8	2.5	1.9	2.4	2.0	3.8	2.5
12	3.0	4.6	6.1	7.6	2.9	2.7	2.5	1.9	2.9	2.3	3.6	2.5
13	3.0	4.2	5.4	7.0	2.8	2.6	2.4	1.9	2.9	2.3	3.5	2.5
14	2.9	4.0	5.1	7.2	2.8	2.5	2.4	1.8	2.6	2.3	3.5	2.4
15	2.9	3.8	5.3	6.9	2.7	2.4	2.4	1.8	2.4	2.3	3.5	2.4
16	2.9	3.6	5.0	6.4	2.7	2.4	2.3	2.4	2.3	2.3	3.4	2.5
17	3.0	3.3	5.0	6.0	2.7	2.3	2.3	2.1	2.4	2.4	3.4	3.1
18	3.3	3.2	5.0	5.5	2.6	2.2	2.2	2.0	2.5	6.5	3.4	3.1
19	3.1	3.1	5.0	4.8	2.6	2.2	2.2	2.0	2.4	7.0	3.3	3.0
20	2.9	3.3	4.9	5.0	2.5	2.2	2.1	1.9	2.3	6.5	3.3	3.0
21	2.8	3.6	4.8	5.6	2.5	2.2	2.1	1.9	2.3	6.0	3.5	3.0
22	2.8	3.2	4.6	5.1	2.4	2.2	2.0	1.9	2.2	5.0	3.3	2.9
23	3.0	3.2	4.2	4.9	2.4	2.2	2.0	1.9	2.2	5.0	3.3	5.0
24	5.4	3.1	4.0	4.5	2.4	2.1	2.0	1.9	2.1	4.4	3.2	6.5
25	4.8	3.1	3.7	4.2	2.4	2.1	2.0	1.8	2.0	3.9	3.2	5.7
26	4.1	3.0	3.7	4.0	2.4	2.1	1.9	1.8	2.0	3.6	3.1	5.5
27	3.5	3.0	4.2	3.9	2.4	2.1	1.9	2.0	2.0	3.3	3.1	5.0
28	3.3	3.0	4.7	3.7	2.5	2.1	1.9	2.0	2.0	3.1	3.1	4.7
29	3.2	.....	4.7	3.6	2.5	2.1	1.9	2.1	2.0	2.9	3.1	4.6
30	7.2	.....	5.0	3.6	2.5	2.1	1.8	4.0	2.0	2.7	3.1	4.5
31	10.6	.....	.....	.....	2.4	.....	1.8	4.9	.....	2.6	.....	4.6

Daily discharge, in second-feet, of James River at Buchanan, Va., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3,040	11,600	1,480	5,560	2,340	930	585	385	4,660	515	1,030	1,480
2	9,030	6,480	1,480	5,100	2,340	930	585	385	3,820	515	930	1,360
3	16,500	4,660	1,480	5,100	2,180	835	585	385	2,030	585	835	1,240
4	24,400	3,040	1,480	7,210	2,030	835	585	385	1,360	585	835	1,140
5	9,300	2,680	1,360	13,100	1,880	930	585	450	1,140	585	745	1,140
6	6,720	2,180	1,360	18,700	1,740	930	585	660	930	585	745	1,030
7	4,030	1,880	8,760	13,800	1,740	1,610	585	660	745	515	2,860	1,030
8	2,860	3,620	5,330	13,800	1,610	1,740	1,140	515	745	515	2,500	1,030
9	2,340	4,240	3,620	13,100	1,610	1,480	1,140	515	660	515	4,030	930
10	1,880	5,560	6,250	12,500	1,480	1,360	930	450	660	515	3,040	930
11	1,610	5,330	10,100	11,900	1,480	1,240	930	450	835	515	2,680	930
12	1,480	4,240	7,720	11,900	1,360	1,140	930	450	1,360	745	2,340	930
13	1,480	3,430	6,020	10,100	1,240	1,030	835	450	1,360	745	2,180	930
14	1,360	3,040	5,330	10,700	1,240	930	835	385	1,030	745	2,180	835
15	1,360	2,680	5,780	9,850	1,140	835	835	385	835	745	2,180	835
16	1,360	2,340	5,100	8,500	1,140	835	745	835	745	745	2,030	930
17	1,480	1,880	5,100	7,460	1,140	745	745	585	835	835	2,030	1,610
18	1,880	1,740	5,100	6,250	1,030	660	660	515	930	8,760	2,030	1,610
19	1,610	1,610	5,100	4,660	1,030	660	660	515	835	10,100	1,880	1,480
20	1,360	1,880	4,880	5,100	930	660	585	450	745	8,760	1,880	1,480
21	1,240	2,340	4,660	6,480	930	660	585	450	745	7,460	2,180	1,480
22	1,240	1,740	4,240	5,330	835	660	515	450	660	5,100	1,880	1,360
23	1,480	1,740	3,430	4,880	835	660	515	450	660	5,100	1,880	5,100
24	6,020	1,610	3,040	4,030	835	585	515	450	585	3,820	1,740	8,760
25	4,660	1,610	2,500	3,430	835	585	515	385	515	2,860	1,740	6,720
26	3,240	1,480	2,500	3,040	835	585	450	385	515	2,340	1,610	6,250
27	2,180	1,480	3,450	2,860	835	585	450	515	515	1,880	1,610	5,100
28	1,880	1,480	4,450	2,500	930	585	450	515	515	1,610	1,610	4,450
29	1,740	.....	4,450	2,340	930	585	450	585	515	1,360	1,610	4,240
30	10,700	.....	5,100	2,340	930	585	385	3,040	515	1,140	1,610	4,030
31	22,700	.....	5,330	.....	835	.....	385	4,880	.....	1,030	.....	4,240

NOTE.—Daily discharge computed from a rating curve fairly well defined below 20,000 second-feet.

Monthly discharge of James River at Buchanan, Va., for 1911.

[Drainage area, 2,060 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	24,400	1,240	4,910	2.38	2.74	A.
February	11,600	1,480	3,130	1.52	1.58	A.
March	10,100	1,360	4,390	2.13	2.46	A.
April	18,700	2,340	7,720	3.75	4.18	A.
May	2,340	835	1,300	.631	.73	A.
June	1,740	585	880	.427	.48	A.
July	1,140	385	654	.317	.37	A.
August	4,880	385	707	.343	.40	A.
September	4,660	515	1,070	.519	.58	A.
October	10,100	515	2,320	1.13	1.30	A.
November	4,030	745	1,880	.913	1.02	A.
December	8,760	835	2,410	1.17	1.35	A.
The year	24,400	385	2,610	1.27	17.19	

JAMES RIVER AT HOLCOMB ROCK, VA.

Location.—At the works of the Wilson Aluminum Co., at Holcomb Rock, Va.

Records available.—Gage heights January 1, 1900, to December 31, 1911.

Drainage area.—Not measured.

Gage.—A copper float inclosed in a stilling box, with a vertical rod extending up through the power-house floor.

Discharge measurements.—No discharge measurements have been made at this station.

Cooperation.—Gage heights have been furnished the Geological Survey by George O. Seward, general manager of the Wilson Aluminum Co.

Daily gage height, in feet, of James River at Holcomb Rock, Va., for 1911.

[J. H. Webb, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.1	6.3	1.9	4.25	2.4	1.45	1.15	0.7	4.85	0.95	1.45	1.8
2	6.2	4.8	1.9	3.65	2.45	1.4	.9	.8	3.45	.9	1.4	1.7
3	8.5	4.2	1.9	3.5	2.45	1.2	.85	.75	2.35	1.0	1.4	1.65
4	11.0	3.7	1.9	3.9	2.4	1.2	.95	1.1	1.9	1.1	1.25	1.7
5	7.5	3.1	1.6	7.55	2.2	1.25	1.15	1.05	1.65	1.25	1.3	1.65
6	4.8	3.0	2.0	9.55	2.2	1.5	1.75	1.15	1.4	.9	1.3	1.6
7	3.6	2.8	4.0	7.65	1.95	1.7	1.2	1.0	1.3	.95	3.65	1.5
8	2.8	2.6	3.9	6.4	2.05	1.8	1.5	1.0	1.2	1.05	5.4	1.4
9	2.6	2.8	3.2	6.3	1.9	2.45	1.4	.9	1.2	1.0	3.65	1.4
10	2.2	4.3	3.4	6.1	2.0	1.8	1.35	1.05	1.1	1.1	2.95	1.4
11	2.1	4.4	6.3	5.1	2.0	1.25	1.2	.9	1.25	1.15	2.65	1.4
12	2.1	3.5	5.8	4.55	1.8	1.5	1.4	.85	1.25	1.2	2.45	1.3
13	2.0	3.2	4.6	4.0	1.75	1.4	1.4	.65	1.3	1.25	2.35	1.3
14	2.2	3.0	4.2	3.9	1.3	1.3	1.4	1.25	1.5	1.0	2.4	1.3
15	2.3	2.8	4.4	5.1	1.75	1.25	1.7	1.35	1.45	1.3	2.4	1.4
16	2.4	2.6	4.1	6.05	1.5	1.15	1.4	1.4	1.3	1.25	2.3	2.1
17	2.2	2.4	3.6	5.55	1.5	1.15	1.25	1.3	1.15	1.7	2.3	2.4
18	2.2	2.3	3.2	4.65	1.5	1.0	1.15	1.15	1.2	6.85	2.1	2.4
19	2.0	2.0	2.9	4.15	1.5	1.2	1.1	1.1	1.35	8.35	2.1	2.25
20	1.9	2.4	3.2	4.0	1.35	1.25	.95	.85	1.3	4.25	2.55	2.1
21	1.9	2.4	3.9	4.4	1.2	1.2	.65	.8	1.3	3.05	2.6	1.8
22	1.9	2.4	3.6	4.25	1.4	1.2	1.0	1.0	1.2	2.55	2.5	1.8
23	3.6	2.3	3.2	3.7	1.05	1.2	.95	.8	1.2	2.45	2.1	4.15
24	4.6	2.2	3.0	3.65	1.3	1.2	.8	.75	.85	2.3	2.1	6.3
25	3.6	2.2	2.6	3.25	1.3	1.2	.7	.85	1.1	2.3	1.9	5.55
26	3.1	1.9	2.4	2.9	1.25	1.3	.7	.75	1.05	2.15	1.9	5.15
27	2.7	2.0	3.0	2.75	1.35	1.2	.8	1.0	.9	2.05	1.9	5.15
28	2.8	2.0	4.0	2.55	1.3	1.2	.7	.95	.7	1.9	1.9	5.35
29	2.7	.....	3.8	3.25	1.4	1.15	.7	1.0	1.1	1.7	1.8	4.65
30	5.4	.....	3.9	2.3	1.45	1.1	.7	1.65	.9	1.7	1.8	4.0
31	10.5	.....	4.5	.....	1.2	.....	.95	4.4	.....	1.7	.....	3.5

JAMES RIVER AT CARTERSVILLE, VA.

Location.—At the highway bridge crossing James River between Pemberton and Cartersville, about 50 miles above Richmond.

Records available.—January 1, 1899, to December 31, 1911.

Drainage area.—6,230 square miles.

Gage.—A standard chain gage was attached to the highway bridge, July 24, 1903, to replace the wire gage which had been used from January 1, 1899, to that date. The datum of the gage has remained the same since the station was established.

Channel.—The left bank overflows for several hundred feet at a stage of about 20 feet; the right bank does not overflow.

Discharge measurements.—Made from downstream side of six-span highway bridge.

Winter flow.—Occasionally affected by ice for short periods during severe winters.

Accuracy.—Rating curve well developed for ordinary stages. Above the overflow point the discharge is uncertain.

The following discharge measurement was made by Mathers and Dean:

July 30, 1911: Gage height, 0.65 foot; discharge, 1,020 second-feet.

Daily gage height, in feet, of James River at Cartersville, Va., for 1911.

[B. W. Palmore, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.6	11.3	2.4	5.0	3.4	1.35	.....	0.50	7.6	0.74	1.7	2.7
2	7.7	8.0	2.3	4.9	3.2	1.25	0.92	.50	5.4	.69	1.6	2.6
3	8.9	6.7	2.3	4.4	3.1	1.1	.84	.66	4.6	.62	1.5	2.4
4	16.2	5.4	2.2	4.5	3.0	1.1	.76	.61	3.5	.78	1.45	2.1
5	13.0	4.8	2.1	7.0	2.8	1.45	.82	.59	3.0	.92	1.35	2.2
6	9.2	3.9	2.1	11.8	2.8	1.8	.74	.58	2.5	.79	1.35	2.0
7	8.2	3.7	2.2	10.7	2.7	1.6	.74	1.15	2.6	.82	2.0	1.9
8	6.0	3.7	2.8	9.3	2.6	1.7	1.7	1.0	1.35	.80	3.0	1.9
9	4.2	3.6	4.8	8.9	2.6	1.9	2.8	1.0	1.1	.82	6.3	1.8
10	4.0	4.2	4.4	8.0	2.6	1.9	2.2	.78	1.1	.89	4.8	1.7
11	3.2	3.7	5.1	7.2	2.5	1.9	1.35	.80	1.1	1.1	3.8	1.6
12	2.9	4.0	5.7	6.6	2.4	1.7	1.25	.76	1.4	.98	3.4	1.5
13	2.8	4.6	6.3	6.0	2.3	1.45	1.1	.72	1.3	1.0	3.0	1.6
14	2.7	4.1	5.6	5.2	2.2	1.4	1.45	.80	1.3	1.1	2.9	1.6
15	2.6	3.7	5.1	5.1	2.1	1.3	1.3	.79	1.1	1.0	2.7	1.6
16	2.6	3.3	4.9	5.6	1.9	1.2	1.2	1.7	1.4	.99	2.7	2.8
17	2.9	3.2	4.7	7.2	2.0	1.2	1.15	1.5	1.5	1.1	2.8	7.4
18	2.8	3.1	4.2	6.6	1.9	1.15	1.3	1.4	1.15	3.6	2.7	4.9
19	2.6	3.4	4.0	5.8	1.7	1.1	.91	.90	1.1	6.8	2.8	4.1
20	2.5	2.8	3.6	6.0	1.6	1.1	.86	.88	1.1	8.8	2.8	3.2
21	2.4	2.7	3.8	5.7	1.6	1.15	.88	.88	1.3	5.0	2.8	3.0
22	2.5	3.1	4.2	5.5	1.5	1.1	.69	.72	1.1	4.8	3.0	3.1
23	2.9	3.0	4.2	5.4	1.35	1.05	.71	.50	1.15	4.2	2.8	7.4
24	3.7	2.9	4.0	5.0	1.5	.98	.62	.54	1.1	3.7	2.7	8.2
25	5.0	2.7	3.5	4.6	1.4	1.3	.58	.52	.98	3.0	2.6	9.2
26	4.5	2.6	3.4	4.2	1.35	1.7	.72	.72	.81	2.7	2.5	7.7
27	4.1	2.5	3.7	3.9	1.3	1.5	.59	.74	.84	2.4	2.4	7.5
28	3.6	2.4	4.2	3.7	1.3	1.2	.57	.76	.80	2.2	2.8	7.0
29	3.5	.....	4.4	3.5	1.25	1.1	.61	.90	.78	2.0	4.0	6.6
30	3.6	.....	4.8	3.5	1.2	.98	.58	1.2	.78	1.8	3.2	5.8
31	5.4	.....	4.6	.....	1.2	.....	.62	2.2	.....	1.7	.....	.....

Daily discharge, in second-feet, of James River at Cartersville, Va., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6,900	30,300	4,280	10,300	6,440	2,260	1,590	900	17,700	1,260	2,900	4,910
2	18,000	19,000	4,080	10,000	5,990	2,080	1,540	900	11,400	1,180	2,710	4,700
3	22,000	15,000	4,080	8,790	5,770	1,830	1,420	1,140	9,280	1,080	2,530	4,280
4	49,400	11,400	3,880	9,030	5,550	1,830	1,290	1,060	6,670	1,320	2,440	3,680
5	36,700	9,780	3,680	15,900	5,120	2,440	1,390	1,040	5,550	1,540	2,260	3,880
6	23,000	7,590	3,680	32,200	5,120	3,090	1,260	1,020	4,490	1,340	2,260	3,480
7	19,600	7,130	3,880	28,200	4,910	2,710	1,260	1,920	4,700	1,390	3,480	3,280
8	13,000	7,130	5,120	23,300	4,700	2,900	2,900	1,670	2,260	1,360	5,550	3,280
9	8,310	6,900	9,780	22,000	4,700	3,280	5,120	1,670	1,830	1,390	13,800	3,090
10	7,830	8,310	8,790	19,000	4,700	3,280	3,880	1,320	1,830	1,490	9,780	2,900
11	5,990	7,130	10,600	16,500	4,490	3,280	2,260	1,360	1,830	1,830	7,360	2,710
12	5,330	7,830	12,200	14,700	4,280	2,900	2,080	1,290	2,350	1,640	6,440	2,530
13	5,120	9,280	13,800	13,000	4,080	2,440	1,830	1,230	2,170	1,670	5,550	2,710
14	4,910	8,070	11,900	10,800	3,880	2,350	2,440	1,360	2,170	1,830	5,330	2,710
15	4,700	7,130	10,600	10,600	3,680	2,170	2,170	1,340	1,830	1,670	4,910	2,710
16	4,700	6,210	10,000	11,900	3,280	2,000	2,000	2,900	2,350	1,650	4,910	5,120
17	5,330	5,990	9,530	16,500	3,480	2,000	1,920	2,530	2,530	1,830	5,120	17,100
18	5,120	5,770	8,310	14,700	3,280	1,920	2,170	2,350	1,920	6,900	4,910	10,000
19	4,700	6,440	7,830	12,400	2,900	1,830	1,530	1,510	1,830	15,300	5,120	8,070
20	4,490	5,120	6,900	13,000	2,710	1,830	1,450	1,480	1,830	21,600	5,120	5,990
21	4,280	4,910	7,360	12,200	2,710	1,920	1,480	1,480	2,170	10,300	5,120	5,550
22	4,490	5,770	8,310	11,600	2,530	1,830	1,180	1,230	1,830	9,780	5,550	5,770
23	5,330	5,550	8,310	11,400	2,260	1,750	1,220	900	1,920	8,310	5,120	17,100
24	7,130	5,330	7,830	10,300	2,530	1,640	1,080	960	1,830	7,130	4,910	19,600
25	10,300	4,910	6,670	9,280	2,350	2,170	1,020	930	1,640	5,550	4,700	23,000
26	9,030	4,700	6,440	8,310	2,260	2,900	1,230	1,230	1,370	4,910	4,490	18,000
27	8,070	4,490	7,130	7,590	2,170	2,530	1,040	1,260	1,420	4,280	4,280	17,400
28	6,900	4,280	8,310	7,130	2,170	2,000	1,000	1,290	1,360	3,880	5,120	15,900
29	6,670	.....	8,790	6,670	2,080	1,830	1,060	1,510	1,320	3,480	7,830	14,700
30	6,900	.....	9,780	6,670	2,000	1,640	1,020	2,000	1,320	3,090	5,990	12,400
31	11,400	.....	9,280	.....	2,000	.....	1,080	3,880	.....	2,900	.....	12,000

NOTE.—Daily discharge computed from a rating curve, well defined below 10,000 second-feet and fairly well defined below 25,000 second-feet. Discharge July 1 and Dec. 31 interpolated.

Monthly discharge of James River at Cartersville, Va., for 1911.

[Drainage area, 6,230 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	49,400	4,280	10,800	1.73	1.99	A.
February	30,300	4,280	8,270	1.33	1.38	A.
March	13,800	3,680	7,780	1.25	1.44	A.
April	32,200	6,670	13,500	2.17	2.42	A.
May	6,440	2,000	3,680	.591	.68	A.
June	3,280	1,640	2,290	.368	.41	A.
July	5,120	1,000	1,740	.279	.32	A.
August	3,880	900	1,510	.242	.28	A.
September	17,700	1,320	3,420	.549	.61	A.
October	21,600	1,080	4,290	.689	.79	A.
November	13,800	2,260	5,190	.833	.93	A.
December	23,000	2,530	8,340	1.34	1.54	A.
The year	49,400	900	5,880	.944	12.79	

ROANOKE RIVER BASIN.

ROANOKE RIVER AT ROANOKE, VA.

Location.—At the Walnut Street highway bridge at Roanoke, Va.

Records available.—July 10, 1896, to July 14, 1906; May 7, 1908, to December 31, 1911.

Drainage area.—388 square miles.

Gage.—A standard chain gage was attached to the Walnut Street bridge November 28, 1903, to replace the wire gage which had been read from July 10, 1896, to that date. The datum of the gage has remained unchanged since the station was established.

Channel.—Nearly straight, with a width of 160 feet between bridge abutments broken by one pier. The bed of the stream is composed of coarse gravel and small bowlder. The right bank is above high water, but the left bank may overflow at extreme flood stages.

Discharge measurements.—Made from the downstream side of two-span highway bridge.

Winter flow.—Occasionally affected by ice for short periods.

Accuracy.—Owing to varying conditions of flow frequent measurements are required at low stages to adequately define the discharge curve from year to year.

Cooperation.—Gage-height records furnished to the Geological Survey through the courtesy of the Roanoke Railway & Electric Co.

Discharge measurements of Roanoke River at Roanoke, Va., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
July 27	J. G. Mathers	0.68	[a] 82.5
27	Mathers and Dean	.69	79.8
27	.....do	.71	88.9

[a] Measurement made at Jefferson Street Bridge.

Daily gage height, in feet, of Roanoke River at Roanoke, Va., for 1911.

[G. W. Hogshead, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.9	2.0	1.2	1.75	1.55	1.0	0.9	0.68	1.2	0.68	0.8	1.0
2	2.75	1.8	1.15	1.65	1.5	1.0	.9	.68	1.0	.68	.8	.9
3	2.9	1.6	1.15	1.65	1.35	1.0	.85	.68	.95	.68	.8	.9
4	3.2	1.45	1.1	2.5	1.3	1.0	.85	.75	.85	.65	.8	.9
5	2.2	1.4	1.1	4.0	1.3	1.7	1.8	1.1	.8	.65	.8	.9
6	1.9	1.3	2.45	4.0	1.25	1.2	1.0	1.2	.75	.65	.8	.9
7	1.65	1.3	2.7	3.8	1.25	1.1	.9	.8	.75	.7	1.8	.9
8	1.5	1.3	2.2	3.3	1.25	1.7	2.4	.75	.7	.75	1.2	.9
9	1.4	1.3	2.0	2.7	1.25	1.3	1.6	.7	.7	.75	1.3	.9
10	1.35	2.6	3.1	2.5	1.25	1.2	1.2	.68	.7	.75	1.3	.75
11	1.3	2.0	2.9	2.3	1.2	1.1	1.2	.68	.8	.85	1.4	.75
12	1.25	1.85	2.8	2.1	1.2	1.05	1.2	.68	1.0	.8	1.3	.75
13	1.15	1.75	2.6	2.3	1.15	1.0	1.2	.9	.9	.75	1.2	.75
14	1.1	1.6	2.2	2.65	1.15	1.0	1.2	.8	.9	.7	1.2	.75
15	1.05	1.5	2.1	2.5	1.1	1.2	1.0	.75	.85	.7	1.2	1.0
16	1.0	1.4	2.0	2.45	1.1	1.1	.95	.7	.85	.7	1.2	1.4
17	1.0	1.4	1.9	2.4	1.1	1.0	.9	.68	.8	.7	1.2	2.0
18	1.0	1.4	1.9	2.1	1.05	1.0	.9	.67	.75	3.75	1.2	1.7
19	1.0	1.4	1.8	2.0	1.05	1.0	.9	.65	.75	1.5	1.2	1.5
20	1.0	1.5	1.8	2.0	1.0	1.0	.85	.65	.75	1.2	1.2	1.4
21	1.0	1.5	1.8	1.95	1.0	.95	.85	.65	.7	1.1	1.2	1.3
22	1.0	1.45	1.7	1.85	1.0	.9	.8	.62	.7	1.1	1.1	1.3
23	2.0	1.4	1.55	1.8	1.0	.9	.75	.62	.75	1.2	1.1	2.9
24	1.9	1.4	1.5	1.7	1.0	.9	.75	.6	.75	1.1	1.1	2.9
25	1.8	1.35	1.4	1.65	1.0	.9	.75	.6	.7	1.05	1.1	2.9
26	1.5	1.3	1.4	1.55	.95	1.2	.7	.6	.7	1.0	1.0	2.9
27	1.4	1.25	1.6	1.5	.95	1.1	.7	.6	.7	1.0	1.0	3.0
28	1.4	1.2	1.6	1.5	.95	1.0	.7	.6	.68	.9	1.0	2.9
29	1.4	.....	1.55	1.5	.95	.9	.7	.7	.68	.9	1.0	2.6
30	2.5	.....	1.65	1.5	1.0	.9	.7	1.5	.68	.85	1.0	2.0
31	2.2	.....	1.85	.....	1.0	.....	.7	1.2	.....	.85	.....	1.9

Daily discharge, in second-feet, of Roanoke River at Roanoke, Va., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug	Sept.	Oct.	Nov.	Dec.
1	620	690	237	519	403	166	136	82	237	82	110	166
2	1,380	550	218	459	376	166	136	82	166	82	110	136
3	1,540	430	218	459	302	166	123	82	151	82	110	136
4	1,900	351	200	1,130	279	166	123	98	123	76	110	136
5	850	326	200	2,900	279	488	550	200	110	76	110	136
6	620	279	1,080	2,900	258	237	166	237	98	76	110	136
7	459	279	1,330	2,640	258	200	136	110	98	86	550	136
8	376	279	850	2,020	258	488	1,030	98	86	98	237	136
9	326	279	690	1,330	258	279	430	86	86	98	279	136
10	302	1,230	1,780	1,130	258	237	237	82	86	98	279	98
11	279	690	1,540	940	237	200	237	82	110	123	326	98
12	258	585	1,440	770	237	183	237	82	166	110	279	98
13	218	519	1,230	940	218	166	237	136	136	98	237	98
14	200	430	850	1,280	218	166	237	110	136	86	237	98
15	183	376	770	1,130	200	237	166	98	123	86	237	166
16	166	326	690	1,080	200	200	151	86	123	86	237	326
17	166	326	620	1,030	200	166	136	82	110	86	237	690
18	166	326	620	770	183	166	136	80	98	2,580	237	488
19	166	326	550	690	183	166	136	76	98	376	237	376
20	166	376	550	690	166	166	123	76	98	237	237	326
21	166	376	550	655	166	151	123	76	86	200	237	279
22	166	351	488	585	166	136	110	69	86	200	200	279
23	690	326	403	550	166	136	98	69	98	237	200	1,540
24	620	326	376	488	166	136	98	65	98	200	200	1,540
25	550	302	326	459	166	136	98	65	86	183	200	1,540
26	376	279	326	403	151	237	86	65	86	166	166	1,540
27	326	258	430	376	151	200	86	65	86	166	166	1,660
28	326	237	430	376	151	166	86	65	82	136	166	1,540
29	326	.....	403	376	151	136	86	86	82	136	166	1,230
30	1,130	.....	459	376	166	136	86	376	82	123	166	690
31	850	.....	585	.....	166	.....	86	237	.....	123	.....	620

NOTE.—Daily discharge computed from a rating curve well defined below 2,000 second-feet.

Monthly discharge of Roanoke River at Roanoke, Va., for 1911.

[Drainage area, 388 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	1,900	166	512	1.32	1.52	A.
February	1,230	237	408	1.05	1.09	A.
March	1,780	200	659	1.70	1.96	A.
April	2,900	376	982	2.53	2.82	A.
May	403	151	217	.559	.64	A.
June	488	136	199	.513	.57	A.
July	1,030	86	191	.492	.57	A.
August	376	65	107	.276	.32	A.
September	237	82	110	.284	.32	A.
October	2,580	76	213	.549	.63	A.
November	550	110	212	.546	.61	A.
December	1,660	98	535	1.38	1.59	A.
The year	2,580	65	362	.933	12.64	

ROANOKE RIVER AT OLD GASTON, N. C.

Location.—At bridge of Roanoke Railway Co. at Old Gaston, N. C., 1¼ miles north of Thelma, N. C., about three-fourths of a mile below the mouth of Indian Creek, and 2½ miles above the mouth of Deep Creek.

Records available.—December 7 to 31, 1911.

Drainage area.—8,350 square miles.

Gage.—Standard chain gage attached to outside of guard timber on downstream side of second span from right end of decked plate girder bridge of Roanoke Railway Co.

Channel.—Fairly permanent. Point of control, about 1 mile below, is of rock and probably permanent.

Discharge measurements.—Made from downstream side of bridge to which gage is attached. Measuring section broken by 11 bridge piers.

Floods.—Flood of 1877 highest known in this locality. No definite marks preserved at Old Gaston, but from authentic information regarding the crest height as observed in 1877, the approximate height has been determined as about 19 feet, referred to present gage datum. The corresponding discharge is about 275,000 second-feet.

Winter flow.—Ice sometimes forms to considerable thickness at this station. Relation of gage height to discharge probably not affected by ice during December, 1911.

Artificial control.—It has been stated by those engaged in the operation of power plants at Roanoke Rapids and Weldon that a weekly trough has been noticed to occur on Tuesday or Wednesday during periods of low water. Such troughs have been said to be due probably to the weekly shut down of large power plants farther upstream.

Accuracy.—Gage observer considered reliable. The gage being situated about 1 mile from the lower end of a pool approximately 3 miles long, the station is not very sensitive. The left bank overflows in extreme floods, but a fair determination can be made of the overflow discharge around the bridge.

Cooperation.—Station maintained in cooperation with the Virginia-Carolina Power Co., William C. Whitner, president.

The following discharge measurement was made by H. J. Jackson:

December 8, 1911: Gage height, 1.95 feet; discharge, 3,590 second-feet.

Additional measurements made in 1912 were used in determining the rating.

See also discharge measurement of Roanoke River at Weldon, N. C., made December 10, 1911, given under miscellaneous measurements, page 84.

Daily gage height, in feet, and discharge, in second-feet, of Roanoke River at Old Gaston, N. C., for 1911.

[R. A. Howell, observer.]

Day.	December.		Day.	December.		Day.	December.	
	Gage height.	Discharge.		Gage height.	Discharge.		Gage height.	Discharge.
1	.....	.....	11	1.8	3,160	21	3.5	9,500
2	.....	.....	12	1.8	3,160	22	4.6	15,400
3	.....	.....	13	1.6	[a] 2,610	23	4.6	15,400
4	.....	.....	14	1.9	3,450	24	6.9	32,400
5	.....	.....	15	2.5	5,400	25	7.5	37,800
6	.....	.....	16	2.2	4,380	26	6.1	25,900
7	2.0	3,750	17	4.6	15,400	27	5.8	[a] 23,600
8	1.9	3,450	18	6.3	27,400	28	5.0	17,900
9	1.8	3,160	19	5.4	20,700	29	4.4	14,200
10	1.7	2,880	20	4.0	[a] 12,000	30	3.9	11,500
						31	3.5	9,500

[a] Wednesday; see "Artificial control."

NOTE.—Daily discharge computed from a rating curve well defined between 1,900 and 33,300 second-feet and fairly well defined between 34,200 and 181,000 second-feet. Above 194,000 second-feet the rating curve is assumed a tangent.

YADKIN OR PEEDEE RIVER BASIN.

YADKIN RIVER NEAR SALISBURY, N. C.

Location.—At the highway bridge known as the Piedmont Toll Bridge, 1,000 feet above the Southern Railway bridge, 6 miles east of Salisbury, and about 5 miles below the mouth of South Yadkin River.

Records available.—September 24, 1895, to December 31, 1909; September 1, 1911, to December 31, 1911.

Drainage area.—3,400 square miles.

Gage.—Standard chain gage attached to the highway bridge. From the date of establishment to May 31, 1899, the gage was at the Southern Railway bridge, and from the latter date it was at the highway bridge until moved back to the railroad bridge early in the year 1903, where it remained until the end of the year 1905. Since January 1, 1906, the gage has been at the highway bridge on the same datum as originally established there in 1899. The last gage at the railroad bridge read the same as the gage at the highway bridge at gage height 3.2 feet, but was not the same for higher and lower stages. There is some uncertainty as to the datum of the original gage at the railroad bridge.

Channel.—Practically permanent; wide and rather rough.

Discharge measurements.—Made from the highway bridge. During the time that the gage was at the railroad bridge most of the measurements were made from that bridge.

Winter flow.—Ice or snow have little if any effect at this station.

Artificial control.—There are some developed powers on the river and tributaries above which may slightly affect the flow.

Cooperation.—Maintained in cooperation with the North Carolina Electric & Power Co.

Discharge measurements of Yadkin River near Salisbury, N. C., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Sept. 20	R. E. Robertson	1.75	1,290
21	....do	1.78	1,290
21	....do	1.82	1.410

Daily gage height, in feet, of Yadkin River near Salisbury, N. C., for 1911.

[J. T. Yarbrough, observer.]

Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.
1	2.95	1.9	2.2	2.5	16	2.0	1.93	2.5	2.55
2	2.9	1.9	2.15	2.3	17	1.75	1.98	2.5	4.1
3	2.25	1.85	1.83	2.25	18	1.8	5.8	2.45	3.5
4	2.15	1.92	1.95	2.35	19	1.75	7.6	3.1	2.85
5	2.05	1.85	1.95	2.2	20	1.75	4.1	2.85	2.6
6	2.6	1.87	2.15	2.15	21	1.8	3.1	2.6	2.9
7	2.9	1.85	2.4	2.2	22	3.5	2.75	2.45	3.6
8	2.45	1.75	3.0	2.15	23	4.2	5.7	2.35	6.1
9	2.05	1.8	3.1	2.15	24	2.8	5.0	2.35	6.0
10	1.85	1.85	3.4	2.2	25	2.45	3.3	2.25	5.0
11	2.2	2.15	3.1	2.25	26	2.15	2.8	2.35	4.1
12	2.4	2.35	2.75	2.1	27	2.2	2.55	2.3	3.8
13	2.1	2.35	2.95	2.15	28	2.0	2.4	2.3	3.8
14	1.95	2.1	3.2	2.2	29	2.0	2.35	2.75	3.3
15	1.9	1.8	2.75	2.15	30	2.1	2.3	2.8	3.0
					31	.....	2.2	.....	3.0

Daily discharge, in second-feet, of Yadkin River near Salisbury, N. C., for 1911.

Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.
1	4,240	1,530	2,170	2,930	16	1,730	1,590	2,930	3,070
2	4,090	1,530	2,060	2,410	17	1,250	1,690	2,930	8,370
3	2,290	1,440	1,400	2,290	18	1,340	15,800	2,800	6,100
4	2,060	1,570	1,630	2,540	19	1,250	24,800	4,720	3,940
5	1,840	1,440	1,630	2,170	20	1,250	8,370	3,940	3,210
6	3,210	1,470	2,060	2,060	21	1,340	4,720	3,210	4,090
7	4,090	1,440	2,660	2,170	22	6,100	3,640	2,800	6,460
8	2,800	1,250	4,400	2,060	23	8,770	15,300	2,540	17,200
9	1,840	1,340	4,720	2,060	24	3,790	12,200	2,540	16,800
10	1,440	1,440	5,740	2,170	25	2,800	5,390	2,290	12,200
11	2,170	2,060	4,720	2,290	26	2,060	3,790	2,540	8,370
12	2,660	2,540	3,640	1,940	27	2,170	3,070	2,410	7,210
13	1,940	2,540	4,240	2,060	28	1,730	2,660	2,410	7,210
14	1,630	1,940	5,050	2,170	29	1,730	2,540	3,640	5,390
15	1,530	1,340	3,640	2,060	30	1,940	2,410	3,790	4,400
					31	.....	2,170	.....	4,400

NOTE.—Daily discharge computed from a rating curve fairly well defined below 21,700 second-feet.

Monthly discharge of Yadkin River near Salisbury, N. C., for 1911.

[Drainage area, 3,400 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
September	8,770	1,250	2,570	0.756	0.84	A.
October	24,800	1,250	4,360	1.28	1.48	B.
November	5,740	1,400	3,180	.935	1.04	A.
December	17,200	1,940	4,900	1.44	1.66	B.

YADKIN RIVER NEAR PEEDEE, N. C.

Location.—At a private ferry about 1,500 feet below the dam of the Rockingham Power Co., half a mile below the mouth of Smiths Creek, and 1 mile above Partridge Creek.

Records available.—August 9, 1906, to December 31, 1911.

Drainage area.—Not determined.

Gage.—Vertical timber gage on right bank above the ferry landing.

Channel.—Wide with rough bed, mostly rocks, some of which project from surface at low water. Current irregular.

Discharge measurements.—Made from the ferry boat.

Artificial control.—The large water-power plants just above the station and at Whitney, N. C., about 40 miles above, are nearly completed, and when put in operation will cause very great fluctuation at the gage. The tailrace of the Rockingham Power Co.'s plant empties into the river below the gage, so there will be no flow past the gage at times when this plant is using all the flow of the river. Up to the end of 1911 there has not been much artificial regulation of the flow.

Accuracy.—Records unreliable at low stages.

Cooperation.—All gage heights have been furnished the Geological Survey by the engineers of the Rockingham Power Co., who have also made some of the discharge measurements.

Discharge measurements of Yadkin River near Peedee, N. C., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Sept. 26	R. E. Robertson	87.92	4,350
27	do	87.58	3,900

Daily gage height, in feet, of Yadkin River near Peedee, N. C., for 1911.

[W. S. Ide, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	88.6	87.65	87.65	.....	88.1	87.0	87.5	86.4	91.88	87.05	87.45	88.7
2	88.65	87.65	87.7	.....	88.15	86.95	87.1	86.4	89.35	86.98	87.4	88.2
3	90.35	87.65	87.8	88.1	88.2	86.9	86.95	86.45	88.55	86.8	87.25	87.9
4	97.0	87.65	87.85	88.05	88.05	87.0	86.7	86.75	87.8	86.85	87.2	87.8
5	95.5	87.5	87.7	87.95	87.85	87.05	86.7	87.2	88.45	86.82	87.25	87.7
6	92.35	87.55	87.6	88.55	87.75	86.95	86.75	87.1	90.2	86.8	87.35	87.6
7	90.3	87.7	87.7	92.05	87.7	87.1	86.9	88.4	90.25	86.8	87.4	87.5
8	89.4	87.6	87.45	91.85	87.7	88.35	86.75	87.75	89.1	86.75	88.05	87.35
9	88.95	87.85	90.0	94.4	87.8	88.1	86.8	87.65	88.15	86.75	91.1	87.3
10	88.65	92.85	89.95	92.55	87.65	88.6	87.1	87.15	87.6	86.75	94.0	87.45
11	88.35	91.85	89.25	90.65	87.7	87.35	87.25	86.8	87.05	86.85	91.15	87.35
12	88.2	90.6	88.8	89.65	87.6	87.6	87.05	86.6	86.9	86.9	90.1	87.35
13	88.1	90.25	88.55	89.25	87.75	87.4	86.9	86.6	87.35	87.35	88.9	87.45
14	88.0	89.7	90.05	89.05	88.1	87.4	86.9	86.6	87.25	87.65	88.82	87.35
15	87.95	89.1	90.55	89.2	88.1	87.15	87.0	86.55	87.0	87.6	88.88	87.5
16	87.8	88.75	90.15	92.7	88.45	87.0	89.3	87.3	86.75	87.1	88.52	89.8
17	87.75	88.5	89.1	91.9	88.08	86.8	88.3	87.0	86.7	86.85	88.2	93.65
18	87.7	88.3	89.0	90.45	87.75	86.9	87.5	86.7	86.7	89.7	87.95	92.5
19	87.75	88.2	88.3	89.65	87.6	87.95	87.2	86.85	86.58	95.0	88.55	90.45
20	87.85	88.1	.....	89.4	87.45	87.85	87.0	87.05	86.6	93.8	89.05	89.25
21	87.85	88.25	90.15	89.65	87.3	87.6	86.9	87.5	86.95	90.2	88.72	89.65
22	87.8	88.25	89.2	89.5	87.25	87.4	86.8	86.75	87.78	88.8	88.25	92.7
23	87.8	88.1	88.55	89.05	87.35	87.2	86.8	86.5	88.32	88.6	87.95	95.4
24	87.75	87.95	88.25	88.75	87.3	.....	86.7	86.5	90.28	92.4	87.75	98.55
25	87.8	87.8	88.05	88.55	87.35	87.1	86.65	86.5	88.7	92.1	87.65	96.2
26	87.75	87.75	.....	88.45	87.25	87.2	86.65	86.4	87.98	89.4	87.7	94.35
27	87.7	87.7	88.15	88.3	87.1	87.2	86.65	86.48	87.48	88.5	87.7	92.15
28	87.7	87.7	89.5	88.2	87.05	87.1	86.6	86.68	87.25	88.1	87.7	91.1
29	87.65	.....	89.7	88.1	86.95	86.9	86.55	87.4	87.18	88.0	87.65	90.55
30	87.6	.....	89.2	88.08	86.95	87.35	86.45	88.05	87.08	87.6	89.55	89.85
31	87.6	.....	88.9	.....	87.05	.....	86.45	92.55	.....	87.65	.....	89.3

Daily discharge, in second-feet, of Yadkin River near Peedee, N. C., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5,930	3,820	3,820	.....	4,790	2,510	3,500	.....	14,400	2,600	3,400	6,160
2	6,040	3,820	3,920	.....	4,900	.....	2,700	.....	7,720	.....	3,300	5,010
3	10,300	3,820	4,130	4,790	5,010	.....	.....	.....	5,820	.....	3,000	4,350
4	.....	3,820	4,240	4,680	4,680	2,510	.....	.....	4,130	.....	2,900	4,130
5	.....	3,500	3,920	4,460	4,240	2,600	.....	2,900	5,580	.....	3,000	3,920
6	.....	3,600	3,710	5,820	4,020	.....	.....	2,700	9,900	.....	3,200	3,710
7	10,200	3,920	3,920	.....	3,920	2,700	.....	5,470	10,000	.....	3,300	3,500
8	7,850	3,710	3,400	14,300	3,920	5,360	.....	4,020	7,120	.....	4,680	3,200
9	6,760	4,240	9,380	.....	4,130	4,790	.....	3,820	4,900	.....	12,300	3,100
10	6,040	.....	9,250	.....	3,820	5,930	2,700	2,800	3,710	.....	.....	3,400
11	5,360	14,300	7,480	11,100	3,920	3,200	3,000	.....	2,600	.....	12,400	3,200
12	5,010	10,900	6,400	8,480	3,710	3,710	2,600	.....	.....	.....	9,604	3,200
13	4,790	10,000	5,820	7,480	4,020	3,300	.....	.....	3,200	3,200	6,640	3,400
14	4,570	8,600	9,510	7,000	4,790	3,300	.....	.....	3,000	3,820	6,450	3,200
15	4,460	7,120	10,800	7,360	4,790	2,800	2,510	.....	2,510	3,710	6,590	3,500
16	4,130	6,280	9,770	.....	5,580	2,510	7,600	3,100	.....	2,700	5,750	8,860
17	4,020	5,700	7,120	14,400	4,750	.....	5,240	2,510	.....	.....	5,010	.....
18	3,920	5,240	6,880	10,600	4,020	.....	3,500	.....	.....	8,600	4,460	.....
19	4,020	5,010	5,240	8,480	3,710	4,460	2,900	.....	.....	.....	5,820	10,600
20	4,240	4,790	.....	7,850	3,400	4,240	2,510	2,600	.....	.....	7,000	7,480
21	4,240	5,120	9,770	8,480	3,100	3,710	.....	3,500	.....	9,900	6,210	8,480
22	4,130	5,120	7,360	8,100	3,000	3,330	.....	.....	4,090	6,400	5,120	.....
23	4,130	4,790	5,820	7,000	3,200	2,900	.....	.....	5,290	5,930	4,460	.....
24	4,020	4,460	5,120	6,280	3,100	.....	.....	.....	10,100	.....	4,020	.....
25	4,130	4,130	4,680	5,820	3,200	2,700	.....	.....	6,160	.....	3,820	.....
26	4,020	4,020	.....	5,580	3,000	2,900	.....	.....	4,530	7,850	3,920	.....
27	3,920	3,920	4,900	5,240	2,700	2,900	.....	.....	3,460	5,700	3,920	.....
28	3,920	3,920	8,100	5,010	2,600	2,700	.....	.....	3,000	4,790	3,920	12,300
29	3,820	.....	8,600	4,790	.....	.....	.....	3,300	2,860	4,570	3,820	10,800
30	3,710	.....	7,480	4,750	.....	3,200	.....	4,680	2,660	3,710	8,220	8,990
31	3,710	.....	6,640	.....	2,600	.....	.....	.....	.....	3,820	.....	7,600

NOTE.—Daily discharge computed from a rating curve fairly well defined between 2,700 and 13,400 second-feet. Below 2,500 and above 15,000 second-feet the rating is very uncertain and daily discharge has not been computed.

PEEDEE RIVER AT CHERAW, S. C.

Location.—At the highway bridge in Cheraw, S. C., below the bridge of the Seaboard Air Line Railway.

Records available.—April 1, 1891, to August 27, 1908, and November 2, 1909, to December 31, 1911.

Drainage area.—6,670 square miles.

Gage.—Vertical timber attached to bridge pier. The original gage and the bridge to which it was attached were washed away August 27, 1908. The rating for recent years would probably not apply to these old gage heights, and it is not certain that the new gage is set on the same datum as the former gage.

Discharge measurements.—Made from the highway bridge to which the gage is attached. Some measurements have been made at the Seaboard Air Line Railway bridge one-half mile above.

Artificial control.—Probably does not seriously affect the 1911 records, but will greatly affect future records when the power plants near Rockingham, N. C., and Whitney, N. C., are in operation.

Accuracy.—The rating is not yet developed for high stages.

Cooperation.—Gage heights are furnished by the United States Weather Bureau.

Discharge measurements of Peedee River at Cheraw, S. C., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Sept. 23	R. E. Robertson	1.97	3,270
25	do	6.16	8,120
25	do	5.87	7,750

Daily gage height, in feet, of Peedee River at Cheraw, S. C., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.9	2.3	2.5	4.2	2.9	1.4	1.5	1.0	22.4	1.8	2.8	5.8
2	4.2	2.2	2.5	3.9	2.8	1.4	1.5	1.0	16.4	1.7	2.2	5.1
3	4.5	2.3	2.7	3.7	2.7	1.5	1.4	.9	10.6	1.6	2.1	3.9
4	20.2	2.3	2.7	3.4	2.9	1.4	1.4	1.1	7.5	1.5	1.9	3.1
5	25.4	2.3	2.6	3.1	3.1	1.3	1.3	1.8	4.2	1.4	1.8	2.9
6	21.3	2.2	2.5	2.8	2.9	1.3	1.3	1.8	2.6	1.3	1.7	2.7
7	14.2	2.1	2.5	2.6	2.6	1.4	1.3	1.6	4.6	1.3	1.7	2.6
8	8.5	2.1	2.7	9.8	2.4	1.6	1.3	1.6	10.8	1.2	2.3	2.4
9	5.8	2.2	6.1	17.8	2.3	3.2	1.2	2.8	6.8	1.2	6.0	2.4
10	4.7	2.3	7.3	18.5	2.3	3.4	1.2	2.5	3.9	1.2	19.0	2.1
11	4.2	14.2	5.9	13.3	2.2	2.6	1.2	2.1	2.3	1.2	18.4	1.9
12	3.9	11.0	5.0	8.5	2.1	2.0	1.1	1.8	2.0	1.4	11.3	1.7
13	3.7	8.7	4.3	6.4	2.0	2.7	1.1	1.5	1.8	1.8	6.1	1.6
14	3.5	6.2	4.0	4.8	3.3	3.1	1.3	1.3	1.7	1.6	5.8	1.5
15	3.2	7.4	8.9	5.1	3.1	2.3	1.3	1.2	1.6	1.4	4.6	1.4
16	3.0	5.5	9.1	11.2	2.9	1.9	3.0	1.1	1.5	1.3	4.2	5.0
17	2.9	4.1	6.7	14.8	2.7	1.9	4.6	1.1	1.5	1.2	4.6	16.0
18	2.8	3.2	5.2	10.9	3.2	1.8	3.9	1.0	1.4	2.0	3.8	19.3
19	3.9	3.4	4.1	8.1	2.9	1.7	3.1	1.4	1.3	14.0	3.5	14.7
20	4.0	3.3	3.3	6.0	2.2	1.9	2.1	1.5	1.2	22.2	3.0	8.4
21	3.7	3.1	3.1	4.8	2.0	2.2	1.8	1.8	1.1	15.3	2.8	5.6
22	3.2	3.1	7.4	6.1	1.9	2.4	1.6	2.9	1.1	8.0	2.5	13.1
23	2.9	2.9	6.5	5.6	1.8	2.1	1.5	2.1	2.8	4.4	3.7	20.0
24	2.8	3.1	4.3	4.7	1.7	1.9	1.5	1.8	5.6	8.1	3.0	30.4
25	2.6	3.1	3.2	4.1	1.6	1.7	1.4	1.6	9.5	13.5	2.8	29.5
26	2.5	2.9	2.9	3.7	1.6	1.6	1.3	1.4	6.3	10.3	2.8	26.6
27	2.5	2.7	2.9	3.4	1.6	2.0	1.3	1.3	3.4	6.2	2.7	22.4
28	2.4	2.6	4.1	3.1	1.6	1.8	1.2	1.3	2.2	4.0	2.6	17.2
29	2.3	.....	6.9	3.0	1.5	1.7	1.2	1.8	1.9	4.2	3.0	12.7
30	2.2	.....	7.1	3.0	1.5	1.6	1.1	2.8	1.9	4.0	3.7	9.5
31	2.2	.....	5.8	.....	1.5	.....	1.1	9.0	.....	3.2	.....	7.3

Daily discharge, in second-feet, of Peedee River at Cheraw, S. C., for 1909–1911.

Day.	Nov.	Dec.	Day.	Nov.	Dec.
1909.			1909.		
1	.....	3,210	16	3,580	13,800
2	.....	3,210	17	3,580	8,320
3	3,880	3,300	18	3,480	6,360
4	3,680	3,480	19	3,390	4,850
5	3,580	3,300	20	3,390	5,290
6	3,480	3,120	21	3,390	4,740
7	3,390	3,120	22	3,300	4,300
8	5,290	3,210	23	3,210	4,190
9	4,190	3,480	24	3,210	4,080
10	3,780	3,210	25	3,480	3,880
11	3,680	4,080	26	3,300	4,080
12	3,480	3,780	27	3,210	4,300
13	3,580	4,080	28	3,210	4,630
14	4,190	4,850	29	3,300	4,410
15	3,780	9,300	30	3,210	4,080
			31	.....	3,980

Daily discharge, in second-feet, of Peedee River at Cheraw, S. C., for 1909–1911—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1910.												
1	3,780	15,500	9,450	3,980	4,080	3,300	3,780	3,300	4,520	2,940	2,940	2,940
2	3,580	10,400	.....	3,980	3,980	3,210	3,580	3,120	7,640	3,120	2,940	2,850
3	3,390	7,380	.....	3,880	3,780	2,940	3,780	3,300	.....	3,120	2,850	2,760
4	3,210	6,600	.....	3,780	3,680	2,760	3,880	3,210	.....	2,940	2,940	2,760
5	4,080	6,860	.....	3,780	3,680	2,600	3,680	3,030	.....	2,850	3,120	2,850
6	4,520	6,480	17,600	3,880	3,480	3,300	3,390	3,030	.....	2,850	3,300	3,120
7	4,080	5,640	11,100	3,980	3,300	4,080	3,300	5,760	13,400	2,940	3,210	3,390
8	3,680	5,290	12,100	4,080	3,300	4,410	3,300	9,300	9,900	3,120	3,210	5,760
9	3,980	4,630	10,800	3,980	12,400	3,980	5,070	7,900	6,600	8,600	3,120	10,000
10	4,520	4,960	7,770	3,880	.....	4,630	5,400	5,640	5,180	.....	3,120	8,180
11	6,240	6,240	6,120	3,780	14,500	6,990	5,520	4,740	5,880	.....	3,030	5,180
12	4,740	13,600	6,480	3,680	9,020	9,300	6,120	4,080	6,000	13,900	2,940	3,980
13	4,080	.....	10,500	3,580	6,240	14,500	7,250	3,780	5,400	7,900	2,940	3,580
14	3,680	17,000	11,900	3,580	4,850	.....	6,360	3,390	4,520	5,640	2,850	3,480
15	3,580	13,800	10,200	3,780	4,410	.....	6,860	3,780	4,190	4,630	2,850	3,390
16	3,680	8,880	7,120	3,880	4,190	.....	12,600	3,480	3,880	4,080	2,850	3,300
17	3,780	6,600	6,360	3,980	4,080	.....	.....	3,300	3,680	3,780	2,760	3,210
18	3,580	9,750	5,400	4,740	3,980	.....	10,000	3,480	3,480	3,580	2,760	3,120
19	3,680	.....	5,290	9,600	3,780	.....	6,860	3,300	3,390	3,390	2,760	3,300
20	3,780	.....	5,180	8,460	3,680	12,600	5,880	3,120	3,300	4,190	2,760	3,580
21	3,880	.....	5,070	6,480	3,580	7,900	7,900	3,030	3,210	5,640	2,680	3,480
22	8,460	17,400	4,960	5,400	3,980	8,180	5,640	3,030	3,120	5,400	2,680	3,390
23	.....	.....	4,850	4,740	4,080	6,600	4,630	2,940	3,030	4,740	2,680	3,300
24	17,800	.....	4,850	4,300	3,880	5,290	3,880	2,940	3,030	4,740	2,680	3,300
25	10,200	13,900	4,740	4,190	3,880	4,740	3,480	2,850	2,940	4,190	2,600	4,520
26	8,600	14,100	4,630	4,080	4,080	4,630	3,300	5,760	2,940	3,980	2,600	6,120
27	7,120	12,100	4,410	3,980	4,300	4,410	3,300	4,520	2,940	3,780	2,600	5,880
28	6,240	10,800	4,300	4,190	3,980	4,190	3,580	4,080	2,850	3,480	2,600	6,240
29	10,500	.....	4,190	4,190	3,680	3,880	4,850	3,780	2,850	3,210	2,760	6,000
30	.....	.....	4,080	3,980	3,580	3,680	4,410	3,480	2,760	3,120	3,030	4,520
31	.....	.....	4,080	.....	3,390	.....	3,390	3,880	.....	3,030	.....	4,850
1911.												
1	5,290	3,580	3,780	5,640	4,190	2,760	2,850	2,440	.....	3,120	4,080	7,640
2	5,640	3,480	3,780	5,290	4,080	2,760	2,850	2,440	.....	3,030	3,480	6,730
3	6,000	3,580	3,980	5,070	3,980	2,850	2,760	2,360	15,200	2,940	3,390	5,290
4	.....	3,580	3,980	4,740	4,190	2,760	2,760	2,520	10,000	2,850	3,210	4,410
5	.....	3,580	3,880	4,410	4,410	2,680	2,680	3,120	5,640	2,760	3,120	4,190
6	.....	3,480	3,780	4,080	4,190	2,680	2,680	3,120	3,880	2,680	3,030	3,980
7	.....	3,390	3,780	3,880	3,880	2,760	2,680	2,940	6,120	2,680	3,030	3,880
8	11,600	3,390	3,980	13,800	3,680	2,940	2,680	2,940	15,500	2,600	3,580	3,680
9	7,640	3,480	8,040	.....	3,580	4,520	2,600	4,080	9,020	2,600	7,900	3,680
10	6,240	3,580	9,750	.....	3,580	4,740	2,600	3,780	5,290	2,600	.....	3,390
11	5,640	.....	7,770	.....	3,480	3,880	2,600	3,390	3,580	2,600	.....	3,210
12	5,290	15,900	6,600	11,600	3,390	3,300	2,520	3,120	3,300	2,760	16,500	3,030
13	5,070	11,900	5,760	8,460	3,300	3,980	2,520	2,850	3,120	3,120	8,040	2,940
14	4,850	8,180	5,400	6,360	4,630	4,410	2,680	2,680	3,030	2,940	7,640	2,850
15	4,520	9,900	12,200	6,730	4,410	3,580	2,680	2,600	2,940	2,760	6,120	2,760
16	4,300	7,250	12,600	16,300	4,190	3,210	4,300	2,520	2,850	2,680	5,640	6,600
17	4,190	5,520	8,880	.....	3,980	3,210	6,120	2,520	2,850	2,600	6,120	.....
18	4,080	4,520	6,860	15,700	4,520	3,120	5,290	2,440	2,760	3,300	5,180	.....
19	5,290	4,740	5,520	11,000	4,190	3,030	4,410	2,760	2,680	.....	4,850	.....
20	5,400	4,630	4,630	7,900	3,480	3,210	3,390	2,850	2,600	.....	4,300	11,400
21	5,070	4,410	4,410	6,360	3,300	3,480	3,120	3,120	2,520	.....	4,080	7,380
22	4,520	4,410	9,900	8,040	3,210	3,680	2,940	4,190	2,520	10,800	3,780	.....
23	4,190	4,190	8,600	7,380	3,120	3,390	2,850	3,390	4,080	5,880	5,070	.....
24	4,080	4,410	5,760	6,240	3,030	3,210	2,850	3,120	7,380	11,000	4,300	.....
25	3,880	4,410	4,520	5,520	2,940	3,030	2,760	2,940	13,200	.....	4,080	.....
26	3,780	4,190	4,190	5,070	2,940	2,940	2,680	2,760	8,320	14,600	4,080	.....
27	3,780	3,980	4,190	4,740	2,940	3,300	2,680	2,680	4,740	8,180	3,980	.....
28	3,680	3,880	5,520	4,410	2,940	3,120	2,600	2,680	3,480	5,400	3,880	.....
29	3,580	.....	9,160	4,300	2,850	3,030	2,600	3,120	3,210	5,640	4,300	.....
30	3,480	.....	9,450	4,300	2,850	2,940	2,520	4,080	3,210	5,400	5,070	13,200
31	3,480	.....	7,640	.....	2,850	.....	2,520	12,400	.....	4,520	.....	9,750

NOTE.—Daily discharge computed from a rating curve that is fairly well defined between 3,000 and 14,000 second-feet. On days for which no discharge is given it was greater than 17,800 second-feet.

SAVANNAH RIVER BASIN.

TALLULAH RIVER AT TALLULAH FALLS, GA.

Location.—At the wagon bridge at Tallulah Falls, about one-fourth mile above the beginning of the falls proper and 3½ miles above the junction of Tallulah and Chattooga rivers. No important streams flow into Tallulah River below the station.

Records available.—August 29 to October 19, 1900; January 18 to December 31, 1901; July 15, 1904, to December 31, 1911.

Drainage area.—191 square miles.

Gage.—Standard chain gage attached to the bridge; datum and readings same as the original vertical gage.

Channel.—Rocky bed, rather deep; slow current at low stages, becoming very swift at high stages. Some change of rating has occurred, probably caused by bowlders lodging on or washing away from shallow, rocky crest a short distance below.

Discharge measurements.—Made from the upstream side of the wagon bridge.

Accuracy.—For flood stages above gage height 6 feet the rating is not well developed.

Cooperation.—Station maintained in cooperation with the Northern Contracting Co.

Discharge measurements of Tallulah River at Tallulah Falls, Ga., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 14	M. R. Hall	1.35	352
14	....do	1.34	353
Dec. 13	R. E. Robertson	1.21	308
13	....do	1.21	311

Daily gage height, in feet, of Tallulah River at Tallulah Falls, Ga., for 1911.

[Wiley Pitts, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.0	1.4	1.65	1.5	2.5	1.55	1.0	1.15	1.05	0.8	1.05	1.5
2	3.6	1.3	1.6	1.5	2.35	1.4	1.05	1.4	.9	.8	.97	1.4
3	4.3	1.25	1.5	1.5	2.2	1.4	1.0	2.3	.9	.8	.97	1.3
4	3.2	1.45	1.45	1.85	2.1	1.5	1.05	2.2	.95	.75	.97	1.25
5	2.4	1.4	1.4	5.8	2.1	1.4	1.1	1.7	.9	.75	1.05	1.25
6	2.1	1.4	1.4	3.7	2.05	1.4	1.05	1.55	1.55	.7	1.4	1.3
7	2.0	1.4	1.4	3.2	2.0	1.4	1.0	1.4	1.2	.7	1.55	1.25
8	1.9	1.6	1.45	3.2	2.0	1.45	1.05	1.45	1.0	.7	1.5	1.25
9	1.75	2.2	1.4	3.2	2.0	1.7	1.35	1.3	.95	.75	2.6	1.17
10	1.7	2.05	1.4	2.75	1.9	1.4	1.1	1.15	1.0	.8	1.8	1.2
11	1.6	1.8	1.4	2.7	1.9	1.3	1.05	1.1	1.25	2.6	1.6	1.3
12	1.55	1.9	1.4	4.0	1.8	1.3	1.15	1.05	.95	1.8	1.55	1.3
13	1.5	1.8	1.35	3.8	1.8	1.2	1.2	1.0	.9	1.3	1.6	1.25
14	1.5	1.75	1.35	3.6	1.8	1.2	1.2	1.05	.8	1.1	1.5	1.2
15	1.4	1.7	1.35	3.3	1.8	1.2	1.15	1.05	.78	.95	1.45	1.3
16	1.4	1.6	1.3	2.95	1.7	1.2	1.35	1.05	1.0	.95	1.45	2.0
17	1.4	1.6	1.3	2.75	1.7	1.2	2.5	1.0	.9	3.4	1.4	1.65
18	1.45	1.55	1.3	2.65	1.7	1.2	1.3	1.0	.9	2.8	1.9	1.55
19	1.45	1.5	1.4	2.8	1.7	1.35	1.2	.95	.85	1.9	1.6	1.45
20	1.4	1.95	1.6	2.85	1.7	1.35	1.1	.9	.78	1.65	1.45	1.5
21	1.4	1.65	1.4	2.6	2.4	1.35	1.3	.85	1.05	1.5	1.4	2.7
22	1.4	1.55	1.3	2.45	1.8	1.2	1.35	.78	1.0	1.65	1.35	3.0
23	1.35	1.5	1.3	2.4	1.85	1.4	1.1	.78	2.2	1.4	1.4	3.0
24	1.3	1.45	1.3	2.3	2.05	1.2	1.1	.78	1.45	1.3	1.5	2.5
25	1.25	1.4	1.3	2.25	1.75	1.15	1.3	.78	1.3	1.2	1.35	2.2
26	1.35	1.4	1.9	2.2	1.7	1.1	1.0	.78	1.1	1.2	1.3	2.3
27	1.4	1.5	2.35	2.15	1.6	1.1	1.0	.78	.95	1.2	1.3	3.2
28	1.3	1.4	1.85	2.2	1.6	1.1	1.0	.80	.95	1.15	1.95	2.6
29	1.3	.....	1.8	2.3	1.6	1.1	.95	.78	.9	1.15	1.7	2.2
30	1.4	.....	1.7	2.25	1.5	1.15	.88	1.55	.9	1.1	1.5	2.1
31	1.4	.....	1.6	.....	1.55	.....	.88	1.35	.....	1.1	.....	3.3

Daily discharge, in second-feet, of Tallulah River at Tallulah Falls, Ga., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	610	365	460	400	850	420	237	280	251	189	251	400
2	1,730	330	440	400	775	365	251	365	212	189	230	365
3	2,580	312	400	400	700	365	237	750	212	189	230	330
4	1,330	382	382	542	655	400	251	700	224	178	230	312
5	800	365	365	4,730	655	365	265	480	212	178	251	312
6	655	365	365	1,840	632	365	251	420	420	168	365	330
7	610	365	365	1,330	610	365	237	365	295	168	420	312
8	565	440	382	1,330	610	382	251	382	237	168	400	312
9	500	700	365	1,330	610	480	348	330	224	178	910	286
10	480	632	365	1,000	565	365	265	280	237	189	520	295
11	440	520	365	970	565	330	251	265	312	910	440	330
12	420	565	365	2,200	520	330	280	251	224	520	420	330
13	400	520	348	1,960	520	295	295	237	212	330	440	312
14	400	500	348	1,730	520	295	295	251	189	265	400	295
15	365	480	348	1,420	520	295	280	251	185	224	382	330
16	365	440	330	1,140	480	295	348	251	237	224	382	610
17	365	440	330	1,000	480	295	850	237	212	1,520	365	460
18	382	420	330	940	480	295	330	237	212	1,030	565	420
19	382	400	365	1,030	480	348	295	224	200	565	440	382
20	365	588	440	1,060	480	348	265	212	185	460	382	400
21	365	460	365	910	800	348	330	200	251	400	365	970
22	365	420	330	825	520	295	348	185	237	460	348	1,170
23	348	400	330	800	542	365	265	185	700	365	365	1,170
24	330	382	330	750	632	295	265	185	382	330	400	850
25	312	365	330	725	500	280	330	185	330	295	348	700
26	348	365	565	700	480	265	237	185	265	295	330	750
27	365	400	775	678	440	265	237	185	224	295	330	1,330
28	330	365	542	700	440	265	237	189	224	280	588	910
29	330	.....	520	750	440	265	224	185	212	280	480	700
30	365	.....	480	725	400	280	207	420	212	265	400	655
31	365	.....	440	.....	420	.....	207	348	.....	265	.....	1,420

NOTE.—Daily discharge computed from a fairly well-defined rating curve.

Monthly discharge of Tallulah River at Tallulah Falls, Ga., for 1911.

[Drainage area, 191 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	2,580	312	567	2.97	3.42	A.
February	700	312	439	2.30	2.40	A.
March	775	330	402	2.10	2.42	A.
April	4,730	400	1,140	5.97	6.66	B.
May	850	400	559	2.93	3.38	A.
June	480	265	331	1.73	1.93	A.
July	850	207	289	1.51	1.74	A.
August	750	185	297	1.55	1.79	A.
September	700	185	258	1.35	1.51	A.
October	1,520	168	367	1.92	2.21	A.
November	910	230	399	2.09	2.33	A.
December	1,420	295	573	3.00	3.46	A.
The year	4,730	168	468	2.45	33.25	

BROAD RIVER (OF GEORGIA) NEAR CARLTON, GA.

Location.—At the Seaboard Air Line Railway bridge, 3 miles east of Carlton, Ga., and 2 miles above the mouth of South Fork of Broad River.

Records available.—May 27, 1897, to December 31, 1911.

Drainage area.—762 square miles.

Gage.—Standard chain gage attached to the railroad bridge; datum unchanged.

Channel.—The bed of the stream is sand and gravel, and may be slightly changeable. The left bank overflows for about 400 feet at a gage height of 16 feet.

Discharge measurements.—Made from the upstream side of decked railroad bridge.

Artificial control.—The flow is affected little or not at all by artificial control.

Cooperation.—Gage heights are furnished by the United States Weather Bureau.

No discharge measurements were made at this station during 1911.

Daily gage height, in feet, of Broad River (of Georgia) near Carlton, Ga., for 1911.

[M. C. Power, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.0	2.5	2.5	2.3	2.6	2.2	2.2	2.3	2.4	2.3	2.4	2.3
2	3.5	2.2	2.2	2.5	2.4	2.4	2.5	2.5	2.2	2.1	2.6	2.0
3	4.6	2.4	2.4	2.2	2.2	2.2	2.3	2.9	2.2	2.4	2.3	2.0
4	4.9	2.7	2.1	2.7	2.0	2.1	2.2	4.1	2.5	2.2	2.1	2.2
5	4.6	2.4	2.6	3.2	2.3	2.2	2.4	3.5	2.7	2.0	2.2	1.9
6	3.5	2.2	2.4	4.6	2.5	2.4	2.2	2.3	5.6	2.1	2.0	2.1
7	3.1	2.3	2.1	3.9	2.3	2.2	2.0	2.1	4.8	1.8	4.5	2.3
8	2.7	2.6	2.3	7.2	2.5	2.3	2.2	2.3	4.0	2.2	4.0	2.1
9	2.4	2.9	2.5	6.4	2.3	2.0	2.3	2.5	2.6	2.4	6.5	2.3
10	2.6	3.4	2.2	5.5	2.0	2.2	2.5	2.2	2.1	2.2	5.0	2.2
11	2.3	3.0	2.4	3.4	2.2	2.3	2.2	2.3	2.3	2.7	3.9	2.0
12	2.5	4.0	2.2	4.4	2.4	2.2	2.3	2.1	2.4	2.5	2.8	1.9
13	2.3	2.9	2.5	5.5	2.2	2.0	2.5	2.2	2.2	2.3	2.4	2.1
14	2.0	2.6	2.7	5.2	2.3	2.1	4.5	2.9	2.6	2.1	2.2	2.2
15	2.3	3.0	2.4	4.6	2.5	2.2	2.5	2.2	2.4	1.9	2.4	2.4
16	2.1	2.7	2.2	4.2	2.3	2.0	3.0	2.4	2.1	2.2	2.1	2.8
17	2.3	2.4	2.4	3.5	2.1	1.8	2.5	2.2	2.3	2.4	2.3	2.3
18	2.5	2.1	2.3	3.3	2.4	2.0	2.2	2.1	2.0	4.4	2.0	3.2
19	2.3	2.5	2.3	3.0	2.2	2.2	2.4	2.4	2.2	3.5	2.3	2.7
20	2.2	2.8	2.5	2.5	2.5	5.8	2.6	2.3	2.5	2.5	2.1	3.0
21	2.4	3.5	2.2	2.9	2.3	3.8	2.3	2.1	2.3	2.7	2.2	4.0
22	2.5	2.9	2.5	2.4	2.6	3.4	2.5	2.2	2.5	4.5	2.4	6.9
23	2.3	2.6	2.3	2.7	2.3	2.3	2.2	2.4	2.2	5.1	2.2	13.9
24	2.4	2.3	2.1	2.4	2.9	2.0	2.4	2.2	2.2	4.3	2.0	8.9
25	2.2	2.1	2.3	2.2	2.6	2.1	3.0	2.4	2.4	3.2	2.3	6.5
26	2.4	2.6	2.5	2.5	2.4	2.2	2.5	2.3	2.2	2.8	2.3	3.5
27	2.7	2.4	3.0	2.3	2.1	2.4	2.1	2.4	2.4	2.5	2.1	2.5
28	2.4	2.1	4.2	2.5	2.2	2.2	2.3	2.2	2.3	2.0	2.0	2.7
29	2.3	.....	3.9	2.8	2.4	2.0	2.0	2.5	2.1	2.4	2.2	2.3
30	2.5	.....	3.5	2.5	2.2	2.4	2.2	2.3	2.3	2.1	2.4	2.5
31	2.2	.....	2.7	.....	2.5	.....	2.0	2.6	.....	2.3	.....	2.9

Daily discharge, in second-feet, of Broad River (of Georgia) near Carlton, Ga., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,070	750	750	645	805	595	595	645	695	645	695	645
2	1,450	595	595	750	695	695	750	750	595	545	805	500
3	2,450	695	695	595	595	595	645	1,000	595	695	645	500
4	2,770	865	545	865	500	545	595	1,970	750	595	545	595
5	2,450	695	805	1,220	645	595	695	1,450	865	500	595	460
6	1,450	595	695	2,450	750	695	595	645	3,560	545	500	545
7	1,140	645	545	1,790	645	595	500	545	2,660	420	2,350	645
8	865	805	645	5,640	750	645	595	645	1,880	595	1,880	545
9	695	1,000	750	4,560	645	500	645	750	805	695	4,690	645
10	805	1,370	595	3,440	500	595	750	595	545	595	2,880	595
11	645	1,070	695	1,370	595	645	595	645	645	865	1,790	500
12	750	1,880	595	2,260	695	595	645	545	695	750	930	460
13	645	1,000	750	3,440	595	500	750	595	595	645	695	545
14	500	805	865	3,100	645	545	2,350	1,000	805	545	595	595
15	645	1,070	695	2,450	750	595	750	595	695	460	695	695
16	545	865	595	2,060	645	500	1,070	695	545	595	545	930
17	645	695	695	1,450	545	420	750	595	645	695	645	645
18	750	545	645	1,290	695	500	595	545	500	2,260	500	1,220
19	645	750	645	1,070	595	595	695	695	595	1,450	645	865
20	595	930	750	750	750	3,800	805	645	750	750	545	1,070
21	695	1,450	595	1,000	645	1,700	645	545	645	865	595	1,880
22	750	1,000	750	695	805	1,370	750	595	750	2,350	695	5,220
23	645	805	645	865	645	645	595	695	595	2,990	595	16,200
24	695	645	545	695	1,000	500	695	595	595	2,160	500	8,070
25	595	545	645	595	805	545	1,070	695	695	1,220	645	4,690
26	695	805	750	750	695	595	750	645	595	930	645	1,450
27	865	695	1,070	645	545	695	545	695	695	750	545	750
28	695	545	2,060	750	595	595	645	595	645	500	500	865
29	645	.....	1,790	930	695	500	500	750	545	695	595	645
30	750	.....	1,450	750	595	695	595	645	645	545	695	750
31	595	.....	865	.....	750	.....	500	805	.....	645	.....	1,000

NOTE.—Daily discharge computed from the rating curve used from 1906 to 1910, the curve being well defined below 9,800 second-feet. As the station was not visited during 1911 it is not known what conditions may have affected the rating, therefore the above estimates should be used with caution.

Monthly discharge of Broad River (of Georgia) near Carlton, Ga., for 1911.

[Drainage area, 762 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	2,770	500	940	1.23	1.42
February	1,880	545	861	1.13	1.18
March	2,060	545	797	1.05	1.21
April	5,640	595	1,630	2.14	2.39
May	1,000	500	671	.881	1.02
June	3,800	420	753	.988	1.10
July	2,350	500	731	.959	1.11
August	1,970	545	736	.966	1.12
September	3,560	500	861	1.13	1.26
October	2,990	420	919	1.21	1.40
November	4,690	500	973	1.28	1.43
December	16,200	460	1,770	2.32	2.68
The year	16,200	420	970	1.27	17.32

NOTE.—See note to daily-discharge table.

ALTAMAHA RIVER BASIN.

OCMULGEE RIVER NEAR JACKSON, GA.

Location.—At Pittman's Ferry, 8 miles southeast of Jackson, Ga., half a mile above the mouth of Yellow Water Creek and a short distance below Heards Creek. The station is 1½ miles below the 100-foot dam and power plant of the Central Georgia Power Co.

Records available.—May 18, 1906, to December 31, 1911.

Drainage area.—1,400 square miles.

Gage.—Vertical staff in three sections on right bank of river upstream side of ferry landing; datum unchanged.

Channel.—Bottom sandy; shifts considerably, but the shifting has little if any effect on the rating, as the control is formed by a rocky ledge about 400 feet below the gage.

Discharge measurements.—Made at the ferry, either from the ferry boat or a small boat held in place by the ferry cable.

Artificial control.—During 1911, since the power plant of the Central Georgia Power Co. has been in operation, the artificial regulation has very greatly affected the distribution of the flow at low stages.

Accuracy.—The records are based on two gage height readings a day, but as there is a large diurnal fluctuation, due to the operation of the power plant above, it is possible that the estimates of daily discharge may be considerably in error for individual days, especially at low stages.

Cooperation.—Gage observer paid by the Central Georgia Power Co.

The following discharge measurement was made by R. E. Robertson:
October 3, 1911: Gage height, 4.09 feet; discharge, 552 second-feet.

Daily gage height, in feet, of Ocmulgee River near Jackson, Ga., for 1911.

[C. A. Pittman, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.35	4.5	4.7	4.15	4.6	4.15	4.05	4.2	3.92	3.95	4.85	4.42
2	4.35	4.6	4.65	4.0	4.6	4.1	3.98	5.0	3.95	4.0	4.85	4.38
3	4.65	4.65	4.6	4.0	4.55	4.1	4.0	6.8	3.95	4.0	4.65	4.35
4	4.6	4.55	4.7	4.35	4.5	4.05	3.95	7.3	3.98	4.0	4.6	4.35
5	4.5	4.55	4.7	4.5	4.45	4.0	4.0	6.0	3.95	3.98	4.4	4.4
6	4.0	4.7	4.7	4.5	4.35	4.0	4.0	5.6	3.98	3.95	4.5	4.35
7	3.62	4.7	4.7	4.4	4.35	4.0	3.95	5.1	4.05	4.0	5.0	4.35
8	3.62	4.8	4.7	4.45	4.3	4.0	4.05	4.65	4.02	3.95	5.3	4.3
9	3.65	4.6	4.7	5.45	4.25	4.0	3.95	4.45	3.98	4.02	6.8	4.3
10	3.52	4.7	4.7	6.2	4.3	3.95	4.4	4.48	3.95	4.08	7.5	4.12
11	3.5	4.75	4.7	6.2	4.35	3.92	4.6	4.38	4.0	4.05	6.4	4.25
12	3.5	4.75	4.7	6.6	4.35	3.95	4.45	4.32	3.95	4.05	5.7	4.28
13	3.35	4.8	4.8	6.3	4.1	4.0	4.5	4.18	4.0	4.02	5.3	4.25
14	4.1	4.7	4.8	6.0	4.65	3.95	4.6	4.18	4.0	4.02	5.05	4.22
15	4.1	4.7	4.7	5.6	4.45	3.9	4.6	4.15	4.02	4.0	4.8	4.38
16	4.1	4.7	4.6	5.35	4.35	3.9	5.1	4.2	3.95	4.08	4.7	4.5
17	4.1	4.6	4.8	5.25	4.3	3.8	5.6	4.15	3.88	4.1	4.6	4.5
18	4.15	4.6	4.8	5.05	4.3	3.95	5.5	4.2	4.0	4.65	4.6	5.1
19	4.15	4.6	4.7	5.0	4.2	3.92	5.1	4.2	4.05	5.1	4.6	4.6
20	4.1	4.6	4.75	5.0	4.25	4.0	4.9	4.2	4.05	4.9	4.6	4.8
21	4.5	4.6	4.75	4.9	4.3	4.3	4.65	4.15	4.05	4.75	4.5	5.3
22	4.65	4.6	4.75	4.8	4.35	4.4	4.6	4.2	4.02	5.45	4.5	7.0
23	4.6	4.8	4.7	4.8	4.45	4.35	4.48	4.12	3.98	5.5	4.5	9.3
24	4.6	4.65	4.7	4.6	4.6	4.25	4.42	4.0	3.92	5.15	4.55	9.0
25	4.6	4.8	4.7	4.6	4.9	4.05	4.45	4.02	3.98	4.8	4.48	8.1
26	4.6	4.8	4.35	4.5	4.75	4.05	4.48	3.9	4.0	4.65	4.38	6.4
27	4.6	4.8	4.1	4.5	4.65	4.15	4.45	4.02	3.98	4.9	4.48	6.2
28	4.6	4.8	4.0	4.55	4.45	4.2	4.38	4.15	4.05	7.8	4.6	6.0
29	4.6	.....	3.98	4.6	4.45	4.15	4.28	4.12	4.0	6.2	4.45	5.6
30	4.6	.....	4.0	4.5	4.3	4.05	4.15	4.02	3.98	5.7	4.42	5.4
31	4.5	.....	4.2	.....	4.2	.....	4.15	4.0	.....	4.95	.....	5.25

Daily discharge, in second-feet, of Ocmulgee River near Jackson, Ga., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	730	925	1,240	518	1,080	518	430	565	334	355	1,520	817
2	730	1,080	1,160	390	1,080	470	376	1,820	355	390	1,520	766
3	1,160	1,160	1,080	390	1,000	470	390	5,510	355	390	1,160	730
4	1,080	1,000	1,240	730	925	430	355	6,540	376	390	1,080	730
5	925	1,000	1,240	925	858	390	390	3,870	355	376	790	790
6	390	1,240	1,240	925	730	390	390	3,050	376	355	925	730
7	178	1,240	1,240	790	730	390	355	2,020	430	390	1,820	730
8	178	1,420	1,240	858	670	390	430	1,160	406	376	2,440	670
9	190	1,080	1,240	2,740	618	390	355	858	376	406	5,510	670
10	146	1,240	1,240	4,280	670	355	790	898	355	454	6,940	489
11	140	1,330	1,240	4,280	730	334	1,080	766	390	430	4,690	618
12	140	1,330	1,240	5,100	730	355	858	694	355	430	3,260	649
13	105	1,420	1,420	4,480	470	390	925	546	390	406	2,440	618
14	470	1,240	1,420	3,870	1,160	355	1,080	546	390	406	1,920	586
15	470	1,240	1,240	3,050	858	320	1,080	518	406	390	1,420	766
16	470	1,240	1,080	2,540	730	320	2,020	565	355	454	1,240	925
17	470	1,080	1,420	2,330	670	260	3,050	518	308	470	1,080	925
18	518	1,080	1,420	1,920	670	355	2,840	565	390	1,160	1,080	2,020
19	518	1,080	1,240	1,820	565	334	2,020	565	430	2,020	1,080	1,080
20	470	1,080	1,330	1,820	618	390	1,620	565	430	1,620	1,080	1,420
21	925	1,080	1,330	1,620	670	670	1,160	518	430	1,330	925	2,440
22	1,160	1,080	1,330	1,420	730	790	1,080	565	406	2,740	925	5,920
23	1,080	1,420	1,240	1,420	858	730	898	489	376	2,840	925	10,600
24	1,080	1,160	1,240	1,080	1,080	618	817	390	334	2,130	1,000	10,000
25	1,080	1,420	1,240	1,080	1,620	430	858	406	376	1,420	898	8,180
26	1,080	1,420	730	925	1,330	430	898	320	390	1,160	766	4,690
27	1,080	1,420	470	925	1,160	520	858	406	376	1,620	898	4,280
28	1,080	1,420	390	1,000	858	565	766	518	430	7,560	1,080	3,870
29	1,080	.....	376	1,080	858	520	649	489	390	4,280	858	3,050
30	1,080	.....	390	925	670	430	518	406	376	3,260	817	2,640
31	925	.....	565	.....	565	.....	518	390	.....	1,720	.....	2,330

NOTE.—Daily discharge computed from a fairly well-defined rating curve.

Monthly discharge of Ocmulgee River near Jackson, Ga., for 1911.

[Drainage area, 1,400 square miles.]

Month.	Discharge, in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	1,160	105	682	0.487	0.56
February	1,420	925	1,210	.864	.90
March	1,420	376	1,110	.793	.91
April	5,100	390	1,840	1.32	1.47
May	1,620	470	837	.598	.69
June	790	260	444	.317	.35
July	3,050	355	963	.688	.79
August	6,540	320	1,190	.850	.98
September	430	334	382	.273	.30
October	7,560	355	1,350	.964	1.11
November	6,940	766	1,740	1.24	1.38
December	10,600	489	2,410	1.72	1.98
The year	10,600	260	1,180	.843	11.42

OCMULGEE RIVER AT MACON, GA.

Location.—At the Fifth Street Bridge in the city of Macon, near the Southern Railway passenger depot and about 500 feet above the Central of Georgia Railway bridge.

Records available.—October 18, 1895, to December 31, 1911.

Drainage area.—2,420 square miles.

Gage.—The United States Weather Bureau gage originally used at this station is a heavy timber bolted to a pier of the Central of Georgia Railway bridge. A standard chain gage was installed October 9, 1905. These gages have been referred to the same datum and have given practically the same readings, varying slightly owing to surface slope between locations.

Channel.—Both banks are high and neither is subject to overflow. The bed of the river is soft and shifting, and a great amount of change in the station rating curve has occurred as the result of changes in the river bed at and below the station.

Discharge measurements.—Made from the downstream side of the highway bridge to which the gage is attached.

Artificial control.—The large power dam near Jackson, Ga., put into operation late in 1910, is likely to cause considerable irregularity in the low-water flow at Macon.

Accuracy.—As the station is situated below the fall line, rapidly rising or falling stages are likely to be attended by variations in surface slope, causing greater or less discharge than for the normal rating. The possible error in mean gage heights due to artificial control may cause the estimates for individual days to be considerably in error, especially at low stages.

Cooperation.—Since June 1, 1899, all gage heights have been furnished by the United States Weather Bureau.

Discharge measurements of Ocmulgee River at Macon, Ga., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
July 27	R. E. Robertson	2.16	1,180
27	do	2.40	1,320
Sept. 14	do	.66	590
14	do	.58	543

Daily gage height, in feet, of Ocmulgee River at Macon, Ga., for 1911.

[W. A. Mitchell, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.4	2.3	3.0	1.6	2.4	1.4	1.0	0.9	0.5	0.7	4.4	2.1
2	2.0	2.3	3.0	1.5	3.0	1.4	.8	1.4	.5	.7	3.7	2.0
3	6.1	2.5	2.6	1.4	3.1	1.2	.5	5.2	.4	.2	3.5	1.9
4	9.4	2.7	2.5	1.2	2.8	1.0	.4	10.3	1.1	.7	3.1	1.6
5	5.3	2.5	2.5	1.4	2.3	1.0	.7	12.1	.5	.7	2.6	1.6
6	3.9	2.3	2.5	3.3	2.2	1.0	.6	9.2	.7	.8	2.0	1.7
7	2.9	2.7	2.6	3.3	2.0	1.0	1.0	6.3	1.0	.8	3.1	1.7
8	1.6	2.7	2.6	2.6	1.7	1.0	.8	4.4	.8	.7	4.3	1.6
9	1.4	2.9	2.7	3.5	1.6	.9	.8	2.9	.8	.7	8.0	1.5
10	1.3	2.9	2.7	6.5	1.6	.9	.8	3.1	.8	.7	12.0	1.4
11	1.0	3.0	2.6	8.4	1.6	.9	.7	2.5	.6	4.5	12.3	1.3
12	1.0	5.2	2.6	9.0	1.6	.6	2.2	2.0	.4	2.6	9.6	1.3
13	.9	4.8	2.6	11.4	1.5	.6	2.0	2.0	.6	1.1	7.0	1.5
14	.9	4.4	2.8	10.2	1.5	.8	2.7	1.5	.7	1.0	5.8	1.5
15	1.4	3.6	2.8	8.7	2.5	.8	8.8	1.4	.6	.8	4.6	1.5
16	1.4	3.1	2.7	7.2	2.0	.8	5.4	1.2	.8	.7	3.8	4.6
17	1.6	3.2	2.2	5.7	1.8	.7	8.6	2.0	.8	1.6	3.3	3.5
18	1.5	2.9	2.6	5.4	1.6	.8	7.3	1.7	.7	3.9	3.1	2.9
19	1.5	2.8	2.7	4.8	1.4	.8	6.2	4.8	.7	3.8	3.2	3.0
20	1.5	2.8	2.5	5.5	1.4	.8	4.4	1.5	.9	4.2	2.5	2.6
21	1.5	3.3	2.5	4.9	1.5	2.8	3.5	1.4	.8	3.5	2.7	10.0
22	2.1	3.0	2.5	4.3	1.5	1.5	3.0	1.0	.8	7.7	2.5	9.5
23	2.5	2.8	2.4	3.7	2.5	1.4	2.7	1.0	.8	14.3	2.3	17.5
24	2.5	2.8	2.3	3.2	5.4	2.0	2.2	.9	1.7	8.8	2.1	16.4
25	2.6	3.1	2.3	3.1	4.1	1.4	1.9	.8	1.0	5.4	2.0	14.8
26	2.6	3.0	2.6	2.7	3.7	.9	1.9	.8	.5	4.2	2.1	12.4
27	2.5	2.8	6.0	2.6	3.0	.8	1.9	1.0	.8	3.8	1.7	10.8
28	2.5	2.8	4.5	2.6	2.4	1.0	2.0	1.0	.8	11.9	2.2	10.3
29	2.5	.....	2.9	2.6	2.0	1.3	1.6	.8	.8	12.8	2.3	8.9
30	2.4	.....	2.1	2.5	1.8	1.2	1.3	.8	.8	7.8	2.2	7.4
31	2.4	.....	1.8	.....	1.6	.....	1.0	.8	.....	6.0	.....	.....

Daily discharge, in second-feet, of Ocmulgee River at Macon, Ga., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,280	1,240	1,550	940	1,280	860	700	665	525	595	2,290	1,140
2	1,100	1,240	1,550	900	1,550	860	630	860	525	595	1,900	1,100
3	3,310	1,320	1,370	860	1,600	780	525	2,770	490	420	1,800	1,060
4	5,760	1,420	1,320	780	1,460	700	490	6,610	740	595	1,600	940
5	2,830	1,320	1,320	860	1,240	700	595	8,940	525	595	1,370	940
6	2,000	1,240	1,320	1,700	1,190	700	560	5,580	595	630	1,100	980
7	1,500	1,420	1,370	1,700	1,100	700	700	3,430	700	630	1,600	980
8	940	1,420	1,370	1,370	980	700	630	2,290	630	595	2,230	940
9	860	1,500	1,420	1,800	940	665	630	1,500	630	595	4,600	900
10	820	1,500	1,420	3,550	940	665	630	1,600	630	595	8,800	860
11	700	1,550	1,370	4,920	940	665	595	1,320	560	2,350	9,220	820
12	700	2,770	1,370	5,400	940	560	1,190	1,100	490	1,370	5,940	820
13	665	2,530	1,370	7,980	900	560	1,100	1,100	560	740	3,900	900
14	665	2,290	1,460	6,500	900	630	1,420	900	595	700	3,130	900
15	860	1,850	1,460	5,160	1,320	630	5,240	860	560	630	2,410	900
16	860	1,600	1,420	4,040	1,100	630	2,890	780	630	595	1,950	2,410
17	940	1,650	1,190	3,070	1,020	595	5,080	1,100	630	940	1,700	1,800
18	900	1,500	1,370	2,890	940	630	4,110	980	595	2,000	1,600	1,500
19	900	1,460	1,420	2,530	860	630	3,370	2,530	595	1,950	1,650	1,550
20	900	1,460	1,320	2,950	860	630	2,290	900	665	2,170	1,320	1,370
21	900	1,700	1,320	2,590	900	1,460	1,800	860	630	1,800	1,420	6,300
22	1,140	1,550	1,320	2,230	900	900	1,550	700	630	4,390	1,320	5,850
23	1,320	1,460	1,280	1,900	1,320	860	1,420	700	630	12,600	1,240	19,800
24	1,320	1,460	1,240	1,650	2,890	1,100	1,190	665	980	5,240	1,140	17,200
25	1,370	1,600	1,240	1,600	2,110	860	1,060	630	700	2,890	1,100	13,700
26	1,370	1,550	1,370	1,420	1,900	665	1,060	630	525	2,170	1,140	9,370
27	1,320	1,460	3,250	1,370	1,550	630	1,060	700	630	1,950	980	7,200
28	1,320	1,460	2,350	1,370	1,280	700	1,100	700	630	8,660	1,190	6,610
29	1,320	.....	1,500	1,370	1,100	820	940	630	630	9,980	1,240	5,320
30	1,280	.....	1,140	1,320	1,020	780	820	630	630	4,460	1,190	4,180
31	1,280	.....	1,020	.....	940	.....	700	630	.....	3,250	.....	3,370

NOTE.—Daily discharge computed from a rating curve fairly well defined below 8,000 second-feet. For stages above 10,000 second-feet the rating is very uncertain.

Monthly discharge of Ocmulgee River at Macon, Ga., for 1911.

[Drainage area, 2,420 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	5,760	665	1,370	0.566	0.65
February	2,770	1,240	1,590	.657	.68
March	3,250	1,020	1,440	.595	.69
April	7,980	780	2,560	1.06	1.18
May	2,890	860	1,220	.504	.58
June	1,460	560	742	.307	.34
July	5,240	490	1,490	.616	.71
August	8,940	630	1,720	.711	.82
September	980	490	616	.255	.28
October	12,600	420	2,470	1.02	1.18
November	9,220	980	2,400	.992	1.11
December	19,800	820	3,930	1.62	1.87
The year	19,800	420	1,800	.744	10.09

OCONEE RIVER NEAR GREENSBORO, GA.

Location.—At the highway bridge 5 miles west of Greensboro on the road to Madison, Ga., about 4 miles above the mouth of Apalachee River and 1½ miles below Town Creek.

Records available.—July 25, 1903, to December 31, 1911.

Drainage area.—1,100 square miles.

Gage.—Standard chain gage attached to the bridge; datum unchanged.

Channel.—Bed composed chiefly of sand; slightly shifting.

Discharge measurements.—Made from the downstream side of the bridge.

Artificial control.—In the spring of 1911 a new dam was completed near Athens, Ga., greatly increasing the storage capacity in that vicinity. The operation of this dam does not appear to cause very great daily fluctuation at Greensboro, but it does cause abnormally low daily discharge at times.

Accuracy.—Owing to the operation of power plants above the station it is probable that the estimates of daily discharge may be somewhat in error for individual days, especially at low stages.

Cooperation.—Gage observer paid by the Central Georgia Power Co.

Discharge measurements of Oconee River near Greensboro, Ga., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Sept. 12	R. E. Robertson	1.16	3.66
12	.....do	1.12	3.56

Daily gage height, in feet, of Oconee River near Greensboro, Ga., for 1911.

[A. M. Thurmond, observer.]

Day.	Jan.	Feb.	Mar.	Ap	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.5	2.1	2.55	2.85	2.95	1.45	1.4	1.8	1.6	1.0	3.4	2.2
2	2.6	2.0	2.55	2.45	3.05	1.45	1.4	10.3	1.4	.6	2.8	2.2
3	3.1	2.1	2.55	2.45	2.8	1.4	1.4	10.4	1.3	1.3	2.5	2.2
4	7.4	2.05	2.35	2.7	2.55	1.4	1.6	10.6	1.9	1.3	2.1	2.0
5	5.8	2.15	2.25	3.65	2.45	1.45	5.3	11.4	1.9	.9	1.85	1.8
6	3.75	2.1	2.25	6.0	2.45	1.3	5.2	9.7	2.2	.65	2.5	1.8
7	3.15	2.35	2.3	5.0	2.35	1.35	4.0	6.2	1.8	.45	8.2	1.8
8	3.05	2.45	1.55	5.2	2.3	1.3	3.3	4.8	1.6	.35	8.8	1.8
9	2.95	2.9	1.3	10.4	2.25	1.35	2.7	3.7	1.4	2.0	11.8	1.8
10	2.8	3.75	2.4	10.8	2.1	1.25	2.0	3.0	1.2	3.4	11.8	1.8
11	2.75	3.55	2.3	7.9	1.95	1.05	1.9	2.4	1.2	1.8	9.6	2.0
12	2.65	5.6	2.2	8.0	1.95	1.2	1.4	2.1	1.3	2.7	4.9	1.8
13	2.55	5.0	2.25	8.2	2.05	1.25	5.9	1.8	1.4	2.0	3.4	2.1
14	2.45	3.95	2.25	7.6	3.2	1.25	9.3	2.0	1.4	1.8	3.4	2.4
15	2.4	3.5	2.1	7.1	2.1	1.15	6.6	2.0	1.4	1.2	2.6	2.5
16	2.35	3.25	2.05	5.8	1.85	.9	9.6	3.6	1.4	1.4	2.8	2.6
17	2.35	3.05	2.0	4.7	1.85	.95	10.2	2.9	1.3	2.2	2.8	3.0
18	2.25	2.85	1.85	3.85	1.85	.9	8.7	3.4	.35	8.2	2.8	3.2
19	2.15	2.75	1.95	3.75	1.85	2.15	4.8	3.6	1.4	6.0	2.3	3.5
20	2.15	3.25	2.25	3.65	1.85	3.35	3.8	2.6	1.4	4.0	2.0	4.3
21	2.05	3.35	2.55	3.55	1.9	2.55	4.4	1.9	1.4	3.3	2.4	6.4
22	2.05	3.4	2.35	3.45	1.9	2.25	5.2	1.6	1.6	5.8	2.2	10.2
23	2.3	3.05	2.05	3.25	2.15	2.1	3.4	1.4	1.8	7.4	2.2	15.2
24	2.1	2.8	1.95	3.0	3.9	1.45	3.3	1.5	2.0	5.0	2.2	16.6
25	2.15	2.65	1.9	2.85	4.0	1.35	4.0	1.4	1.3	3.0	2.2	14.7
26	2.15	2.45	2.2	2.85	3.3	1.45	4.4	1.6	1.4	2.4	2.2	11.0
27	2.15	2.55	6.6	2.8	2.15	1.8	2.7	2.0	1.4	4.8	2.2	8.6
28	2.1	2.55	5.3	2.9	2.05	1.3	2.0	1.6	1.4	6.4	2.2	6.8
29	2.05	.....	3.9	2.95	1.95	1.25	1.8	1.6	1.4	3.4	2.4	5.0
30	2.15	.....	3.4	2.95	1.85	1.35	1.6	1.6	1.2	2.5	2.4	5.4
31	2.1	.....	2.95	.....	1.45	.....	1.6	1.6	.....	2.6	.....	5.6

Daily discharge, in second-feet, of Oconee River near Greensboro, Ga., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	785	647	802	908	942	446	432	550	490	326	1,110	680
2	820	614	802	768	978	446	432	4,940	432	228	890	680
3	995	647	802	768	890	432	432	5,000	404	404	785	680
4	3,110	630	732	855	802	432	490	5,130	582	404	647	614
5	2,220	664	698	1,210	768	446	1,980	5,690	582	301	566	550
6	1,250	647	698	2,330	768	404	1,920	4,540	680	240	785	550
7	1,010	732	715	1,820	732	418	1,360	2,440	550	194	3,590	550
8	978	768	475	1,920	715	404	1,070	1,720	490	172	3,960	550
9	942	925	404	5,060	698	418	855	1,230	432	614	5,970	550
10	890	1,250	750	5,270	647	391	614	960	378	1,110	5,970	550
11	872	1,170	715	3,410	598	339	582	750	378	550	4,480	614
12	838	2,120	680	3,470	598	378	432	647	404	855	1,780	550
13	802	1,820	698	3,590	630	391	2,280	550	432	614	1,110	647
14	768	1,340	698	3,230	1,030	391	4,280	614	432	550	1,110	750
15	750	1,150	647	2,940	647	365	2,660	614	432	378	820	785
16	732	1,050	630	2,220	566	301	4,480	1,190	432	432	890	820
17	732	978	614	1,680	566	314	4,870	925	404	680	890	960
18	698	908	566	1,300	566	301	3,900	1,110	172	3,590	890	1,030
19	664	872	598	1,250	566	664	1,720	1,190	432	2,330	715	1,150
20	664	1,050	698	1,210	566	1,090	1,280	820	432	1,360	614	1,500
21	630	1,090	802	1,170	582	802	1,540	582	432	1,070	750	2,550
22	630	1,110	732	1,130	582	698	1,920	490	490	2,220	680	4,870
23	715	978	630	1,050	664	647	1,110	432	550	3,110	680	8,480
24	647	890	598	960	1,320	446	1,070	460	614	1,820	680	9,530
25	664	838	582	908	1,360	418	1,360	432	404	960	680	8,100
26	664	768	680	908	1,070	446	1,540	490	432	750	680	5,410
27	664	802	2,660	890	664	550	855	614	432	1,720	680	3,830
28	647	802	1,980	925	630	404	614	490	432	2,550	680	2,770
29	630	.....	1,320	942	598	391	550	490	432	1,110	750	1,820
30	664	.....	1,110	942	566	418	490	490	378	785	750	2,020
31	647	.....	942	.....	446	.....	490	490	.....	820	.....	2,120

NOTE.—Daily discharge computed from a rating curve fairly well defined below 6,000 second-feet. Water was being stored at dams above the station on days when the discharge was less than 400 second-feet.

Monthly discharge of Oconee River near Greensboro, Ga., for 1911.

[Drainage area, 1,100 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	3,110	630	894	0.813	0.94	A.
February	2,120	614	974	.885	.92	A.
March	2,660	404	821	.746	.86	A.
April	5,270	768	1,830	1.66	1.85	A.
May	1,360	446	734	.667	.77	A.
June	1,090	301	466	.424	.47	A.
July	4,870	432	1,540	1.40	1.61	A.
August	5,690	432	1,490	1.35	1.56	A.
September	680	172	452	.411	.46	A.
October	3,590	172	1,040	.945	1.09	A.
November	5,970	566	1,490	1.35	1.51	A.
December	9,530	550	2,140	1.95	2.25	A.
The year	9,530	172	1,160	1.05	14.29	

OCONEE RIVER AT FRALEYS FERRY, NEAR MILLEDGEVILLE, GA.

Location.—At Fraleys Ferry, 6 miles above Milledgeville, Ga., and about 4 miles below the mouth of Little River.

Records available.—May 23, 1906, to December 31, 1908; October 6, 1909, to December 31, 1911.

Drainage area.—2,840 square miles.

Gage.—Sloping section of timber, bolted to solid rock on left bank above the ferry landing; datum unchanged.

Channel.—Sandy and shifting at measuring section; rock control below.

Discharge measurements.—Made from ferryboat.

Artificial control.—None below vicinity of Athens, Ga., where storage may cause low daily discharge at this station at times.

Accuracy.—Records excellent, except for high stages which can not be measured.

Cooperation.—Gage observer paid by the Central Georgia Power Co.

The following discharge measurement was made by R. E. Robertson:
September 13, 1911: Gage height, 4.86 feet; discharge, 872 second-feet.

Daily gage height, in feet, of Oconee River at Fraleys Ferry, near Milledgeville, Ga., for 1911.

[H. A. Taylor, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.7	5.5	5.7	5.95	5.9	5.0	4.75	4.9	5.3	4.55	6.0	5.8
2	5.85	5.5	5.7	5.9	5.9	4.9	4.7	6.6	5.15	4.55	6.4	5.6
3	8.0	5.5	5.7	5.8	5.95	4.9	5.0	8.4	5.0	4.5	6.0	5.5
4	9.0	5.5	5.7	5.7	5.8	4.8	5.05	8.3	4.75	4.55	5.8	5.5
5	8.5	5.5	5.6	5.75	5.65	6.25	4.9	8.5	5.25	4.55	5.6	5.45
6	7.0	5.6	5.6	6.8	5.6	6.7	6.8	8.8	5.6	4.5	5.6	5.4
7	6.55	5.6	5.6	7.2	5.5	5.15	6.1	7.5	5.5	4.3	6.6	5.4
8	6.3	5.6	5.6	6.75	5.5	5.0	5.5	6.2	5.35	4.2	7.8	5.4
9	6.1	5.65	5.35	7.8	5.5	4.85	5.1	5.7	5.2	4.2	9.2	5.4
10	6.0	6.0	5.4	8.6	5.5	4.85	5.3	6.0	4.8	5.2	10.4	5.4
11	5.9	6.3	5.6	8.4	5.4	4.9	5.35	6.0	4.8	7.0	9.8	5.4
12	5.8	6.85	5.6	8.0	5.3	4.75	5.15	5.5	4.7	5.8	7.5	5.4
13	5.8	7.4	5.6	8.9	5.3	4.8	4.9	5.6	4.75	5.8	6.7	5.4
14	5.8	6.95	5.6	8.4	5.4	4.8	8.8	5.35	4.7	5.2	6.3	5.4
15	5.8	6.45	5.6	7.9	5.9	4.7	8.8	5.05	4.75	4.95	6.2	5.8
16	5.7	6.3	5.5	7.4	5.45	4.65	7.2	5.2	4.55	4.85	6.0	6.9
17	5.7	6.2	5.4	6.9	5.3	4.6	8.0	5.35	4.5	4.9	5.9	6.4
18	5.7	6.05	5.4	6.55	5.2	4.55	7.8	5.4	4.45	6.6	6.0	6.2
19	5.6	5.9	5.4	6.4	5.2	4.7	7.2	6.1	4.9	7.6	6.2	6.0
20	5.6	5.95	5.4	6.6	5.2	5.05	6.0	6.2	4.85	6.9	5.8	6.3
21	5.6	6.3	5.6	6.45	5.3	5.65	5.6	5.45	5.1	6.0	5.8	8.1
22	5.6	6.2	5.6	6.15	5.35	5.55	6.1	5.15	5.0	6.8	5.6	10.0
23	5.6	6.05	5.6	6.0	5.5	5.3	6.4	5.05	4.85	9.5	5.6	14.4
24	5.6	5.9	5.4	5.9	5.65	5.3	5.8	4.9	5.2	7.8	5.5	13.5
25	5.5	5.8	5.4	5.8	6.3	5.05	5.6	4.95	5.1	6.6	5.6	13.0
26	5.5	5.7	5.85	5.8	6.1	4.9	6.3	5.15	4.9	5.8	5.5	11.5
27	5.5	5.7	8.7	5.7	5.5	5.15	6.0	5.45	4.8	6.2	5.5	9.5
28	5.5	5.7	8.2	5.8	5.25	5.05	5.4	6.6	4.7	11.2	5.7	8.4
29	5.5	.....	7.0	5.85	5.1	4.85	5.1	5.35	4.65	11.0	5.9	8.0
30	5.5	.....	6.4	5.9	5.1	4.75	4.95	4.9	4.6	6.8	5.9	7.4
31	5.5	.....	6.15	.....	5.0	.....	4.9	5.05	.....	6.0	.....	8.4

Daily discharge, in second-feet, of Oconee River at Fraleys Ferry, near Milledgeville, Ga., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,740	1,490	1,740	2,080	2,010	990	795	910	1,270	660	2,150	1,870
2	1,940	1,490	1,740	2,010	2,010	910	760	3,080	1,120	660	2,760	1,610
3	5,650	1,490	1,740	1,870	2,080	910	990	6,450	990	630	2,150	1,490
4	7,650	1,490	1,740	1,740	1,870	830	1,040	6,250	795	660	1,870	1,490
5	6,650	1,490	1,610	1,800	1,680	2,520	910	6,650	1,220	660	1,610	1,440
6	3,770	1,610	1,610	3,420	1,610	3,250	3,420	7,250	1,610	630	1,610	1,380
7	3,000	1,610	1,610	4,130	1,490	1,120	2,300	4,690	1,490	520	3,080	1,380
8	2,000	1,610	1,610	3,340	1,490	990	1,490	2,450	1,320	470	5,200	1,380
9	2,300	1,680	1,320	5,260	1,490	870	1,080	1,740	1,170	470	8,070	1,380
10	2,150	2,150	1,380	6,850	1,490	870	1,270	2,150	830	1,170	10,700	1,380
11	2,010	2,600	1,610	6,450	1,380	910	1,320	2,150	830	3,770	9,340	1,380
12	1,870	3,500	1,610	5,650	1,270	795	1,120	1,490	760	1,870	4,690	1,380
13	1,870	4,500	1,610	7,450	1,270	830	910	1,610	795	1,870	3,250	1,380
14	1,870	3,680	1,610	6,450	1,380	830	7,250	1,320	760	1,170	2,600	1,380
15	1,870	2,840	1,610	5,450	2,010	760	7,250	1,040	795	950	2,450	1,870
16	1,740	2,600	1,490	4,500	1,440	725	4,130	1,170	660	870	2,150	3,590
17	1,740	2,450	1,380	3,590	1,270	690	5,650	1,320	630	910	2,010	2,760
18	1,740	2,220	1,380	3,000	1,170	660	5,200	1,380	600	3,080	2,150	2,450
19	1,610	2,010	1,380	2,700	1,170	760	4,130	2,300	910	4,880	2,450	2,150
20	1,610	2,080	1,380	3,080	1,170	1,040	2,150	2,450	870	3,590	1,870	2,600
21	1,610	2,600	1,610	2,840	1,270	1,680	1,610	1,440	1,080	2,150	1,870	5,850
22	1,610	2,450	1,610	2,380	1,320	1,550	2,300	1,120	990	3,420	1,610	9,780
23	1,610	2,220	1,610	2,150	1,490	1,270	2,700	1,040	870	8,700	1,610	21,100
24	1,610	2,010	1,380	2,010	1,680	1,270	1,870	910	1,170	5,260	1,490	18,600
25	1,490	1,870	1,380	1,870	2,600	1,040	1,610	950	1,080	3,080	1,610	17,200
26	1,490	1,740	1,940	1,870	2,300	910	2,600	1,120	910	1,870	1,490	13,200
27	1,490	1,740	7,050	1,740	1,490	1,120	2,150	1,440	830	2,450	1,490	8,700
28	1,490	1,740	6,050	1,870	1,220	1,040	1,380	3,080	760	12,500	1,740	6,450
29	1,490	.....	3,770	1,940	1,080	870	1,080	1,320	725	12,000	2,010	5,650
30	1,490	.....	2,760	2,010	1,080	795	950	910	690	3,420	2,010	4,500
31	1,490	.....	2,380	.....	990	.....	910	1,040	.....	2,150	.....	6,450

NOTE.—Daily discharge computed from a rating curve well defined below 5,600 second-feet.

Monthly discharge of Oconee River at Frayleys Ferry, near Milledgeville, Ga., for 1911.

[Drainage area, 2,840 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	7,650	1,490	2,330	0.820	0.95	A.
February	4,500	1,490	2,180	.768	.80	A.
March	7,050	1,320	2,020	.711	.82	A.
April	7,450	1,740	3,390	1.19	1.33	A.
May	2,600	990	1,520	.535	.62	A.
June	3,250	660	1,090	.384	.43	A.
July	7,250	760	2,340	.824	.95	A.
August	7,250	910	2,330	.820	.95	A.
September	1,610	600	951	.335	.37	A.
October	12,500	470	2,790	.982	1.13	A.
November	10,700	1,490	2,970	1.05	1.17	A.
December	21,100	1,380	4,940	1.74	2.01	B.
The year	21,100	470	2,410	.849	11.53	

OCONEE RIVER AT DUBLIN, GA.

Location.—At the Wrightville & Tennille Railroad bridge at Dublin, Ga.

Records available.—February 11, 1898, to December 31, 1911; fragmentary records prior to 1898.

Drainage area.—4,180 square miles.

Gage.—Vertical timber attached to the downstream side of the central or turnspan pier of the railroad bridge; also a short sloping section bolted to rock just above the bridge on the right bank. The datum has not been changed.

Channel.—Rocky and nearly permanent at the wagon bridge, but shifting of the bottom in the channel below causes slight changes in the discharge rating. At a stage of about 20 feet the left bank overflows for 1,100 feet through an iron frame trestle approach to the bridge. This ground is thickly covered with brushy growth, which probably retards the flow of water over the overflow section. The right bank does not overflow.

Discharge measurements.—Made from the downstream side of the wagon bridge, 500 feet above the railroad bridge.

Artificial control.—The only power plant of consequence is near Athens, Ga., and is so far above the station that its operation probably does not affect the accuracy of observations at Dublin.

Accuracy.—Lack of data covering changes in channel makes results at this station uncertain prior to 1910. A good degree of accuracy may be obtained by making frequent discharge measurements.

Cooperation.—Since 1898 the gage heights have been furnished by the United States Weather Bureau.

Discharge measurements of Oconee River at Dublin, Ga., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
July 28	R. E. Robertson	1.70	3,020
28	do	1.50	2,820

Daily gage height, in feet, of Oconee River at Dublin, Ga., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.7	0.6	1.0	3.6	1.0	−0.4	−0.7	−0.3	2.1	−1.0	7.8	2.4
2	1.4	6	.9	2.4	1.1	− .4	− .9	− .5	3.6	−1.0	4.8	2.3
3	1.7	.6	.9	1.8	1.2	− .6	−1.0	− .3	2.4	−1.1	2.4	1.8
4	3.6	.6	.9	1.6	1.4	− .8	−1.0	4.9	1.8	−1.1	1.9	1.4
5	6.5	.6	.9	1.4	1.2	− .9	− .9	6.7	1.4	−1.1	1.5	1.2
6	7.0	.6	.9	1.8	.9	− .9	− .2	6.6	− .2	−1.2	1.2	.9
7	7.4	.6	.8	2.1	.8	2.0	− .2	6.6	− .4	−1.2	1.8	.7
8	4.4	.7	.8	3.3	.2	2.1	1.8	6.6	1.4	−1.3	1.2	.7
9	3.7	.9	.7	4.2	.1	.4	.9	5.5	1.5	−1.3	4.2	.4
10	2.5	.9	.7	4.0	.2	.3	.4	5.0	− .2	−1.4	6.0	.3
11	2.2	1.0	.7	5.9	.1	− .1	.3	1.1	− .5	−1.4	6.9	.3
12	1.8	1.2	.6	7.6	− .2	− .3	.3	1.6	− .5	1.4	7.7	.3
13	1.5	2.9	.6	7.5	− .2	− .4	.3	.9	− .6	1.4	8.5	.3
14	1.5	5.1	.9	7.6	− .2	− .4	.4	.8	− .7	1.4	9.0	.3
15	1.5	5.2	.7	7.8	− .3	− .5	2.2	.8	− .7	1.3	6.5	.3
16	1.4	4.1	.7	8.1	− .1	− .6	6.6	.0	− .8	− .1	6.3	.8
17	1.4	3.1	.7	8.2	.3	− .6	6.8	− .2	− .8	− .2	2.3	5.9
18	1.3	2.7	.7	7.2	.2	− .5	6.4	− .3	− .8	− .2	1.5	7.0
19	1.0	2.4	.6	4.9	− .2	− .5	6.4	− .1	− .8	.9	1.2	7.4
20	1.0	1.0	.4	4.5	− .3	− .5	6.0	.7	− .8	3.9	1.3	4.7
21	.9	.7	.4	4.3	− .3	− .5	4.1	2.4	− .5	5.3	1.6	4.1
22	.9	1.9	.4	3.3	− .4	− .2	1.7	1.2	− .4	3.4	1.4	5.8
23	.7	2.2	.6	2.7	− .4	.3	.9	.2	.1	2.8	.9	9.9
24	.4	2.1	.5	1.9	− .3	.4	1.8	− .1	.5	3.9	.8	11.6
25	.7	1.8	.4	2.4	− .2	.4	1.9	− .5	.1	6.0	.3	15.3
26	.9	1.7	.6	1.8	− .1	.3	.9	− .8	.2	6.4	.4	19.0
27	.8	1.2	1.7	1.3	1.5	− .4	.4	− .9	− .1	3.2	.3	19.9
28	.7	1.1	5.4	1.1	1.0	− .5	1.8	− .9	− .2	2.4	.3	17.9
29	.6	.....	7.0	1.0	.9	− .2	.7	.9	− .4	4.2	.4	15.8
30	.6	.....	7.3	1.0	.1	− .4	.1	1.7	− .6	6.6	.9	15.1
31	.6	.....	5.9	.....	.4	.....	.1	.7	.....	7.2	.....	13.1

Daily discharge, in second-feet, of Oconee River at Dublin, Ga., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,180	2,100	2,420	4,720	2,420	1,400	1,220	1,460	3,310	1,040	9,660	3,580
2	2,740	2,100	2,340	3,580	2,500	1,400	1,100	1,340	4,720	1,040	5,980	3,490
3	2,980	2,100	2,340	3,060	2,580	1,280	1,040	1,460	3,580	980	3,580	3,060
4	4,720	2,100	2,340	2,900	2,740	1,160	1,040	6,090	3,060	980	3,140	2,740
5	7,960	2,100	2,340	2,740	2,580	1,100	1,100	8,210	2,740	980	2,820	2,580
6	8,600	2,100	2,340	3,060	2,340	1,100	1,530	8,080	1,530	920	2,580	2,340
7	9,120	2,100	2,260	3,310	2,260	3,220	1,530	8,080	1,400	920	3,060	2,180
8	5,540	2,180	2,260	4,420	1,810	3,310	3,060	8,080	2,740	860	2,580	2,180
9	4,820	2,340	2,180	5,320	1,740	1,950	2,340	6,760	2,820	860	5,320	1,950
10	3,670	2,340	2,180	5,120	1,810	1,880	1,950	6,200	1,530	800	7,360	1,880
11	3,400	2,420	2,180	7,240	1,740	1,600	1,880	2,500	1,340	800	8,470	1,880
12	3,060	2,580	2,100	9,380	1,530	1,460	1,880	2,900	1,340	2,740	9,520	1,880
13	2,820	4,030	2,100	9,250	1,530	1,400	1,880	2,340	1,280	2,740	10,600	1,880
14	2,820	6,310	2,340	9,380	1,530	1,400	1,950	2,260	1,220	2,740	11,400	1,880
15	2,820	6,420	2,180	9,660	1,460	1,340	3,400	2,260	1,220	2,660	7,960	1,880
16	2,740	5,220	2,180	10,100	1,600	1,280	8,080	1,670	1,160	1,600	7,720	2,260
17	2,740	4,220	2,180	10,200	1,880	1,280	8,340	1,530	1,160	1,530	3,490	7,240
18	2,660	3,850	2,180	8,860	1,810	1,340	7,840	1,460	1,160	1,530	2,820	8,600
19	2,420	3,580	2,100	6,090	1,530	1,340	7,840	1,600	1,160	2,340	2,580	9,120
20	2,420	2,420	1,950	5,650	1,460	1,340	7,360	2,180	1,160	5,020	2,660	5,870
21	2,340	2,180	1,950	5,430	1,460	1,340	5,220	3,580	1,340	6,530	2,900	5,220
22	2,340	3,140	1,950	4,420	1,400	1,530	2,980	2,580	1,400	4,520	2,740	7,120
23	2,180	3,400	2,100	3,850	1,400	1,880	2,340	1,810	1,740	3,940	2,340	12,800
24	1,950	3,310	2,020	3,140	1,460	1,950	3,060	1,600	2,020	5,020	2,260	15,700
25	2,180	3,060	1,950	3,580	1,530	1,950	3,140	1,340	1,740	7,360	1,880	22,600
26	2,340	2,980	2,100	3,060	1,600	1,880	2,340	1,160	1,810	7,840	1,950	30,200
27	2,260	2,580	2,980	2,660	2,820	1,400	1,950	1,100	1,600	4,320	1,880	32,100
28	2,180	2,500	6,640	2,500	2,420	1,340	3,060	1,100	1,530	3,580	1,880	27,900
29	2,100	.....	8,600	2,420	2,340	1,530	2,180	2,340	1,400	5,320	1,950	23,600
30	2,100	.....	8,990	2,420	1,740	1,400	1,740	2,980	1,280	8,080	2,340	22,200
31	2,100	.....	7,240	.....	1,950	.....	1,740	2,180	.....	8,860	.....	18,400

NOTE.—Daily discharge computed from a rating curve fairly well defined between 1,800 and 32,300 second-feet.

Monthly discharge of Oconee River at Dublin Ga., for 1911.

[Drainage area, 4,180 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	9,120	1,950	3,360	0.804	0.93	A.
February	6,420	2,100	3,060	.732	.76	A.
March	8,990	1,950	2,940	.703	.81	A.
April	10,200	2,420	5,250	1.26	1.41	A.
May	2,820	1,400	1,900	.455	.52	B.
June	3,310	1,100	1,590	.380	.42	B.
July	8,340	1,040	3,100	.742	.86	B.
August	8,210	1,100	3,170	.758	.87	B.
September	4,720	1,160	1,850	.443	.49	B.
October	8,860	800	3,180	.761	.88	B.
November	11,400	1,880	4,510	1.08	1.20	A.
December	32,100	1,880	9,240	2.21	2.55	B.
The year	32,100	800	3,600	.861	11.70	

EASTERN GULF OF MEXICO DRAINAGE BASINS.

APALACHICOLA RIVER BASIN.

CHATTAHOOCHEE RIVER NEAR NORCROSS, GA.

Location.—At Medlocks Bridge, 4½ miles north of Norcross, Ga., 1½ miles above the mouth of John Creek, and about 5 miles above Suwanee Creek.

Records available.—January 9, 1903, to December 31, 1911.

Drainage area.—1,170 square miles.

Gage.—Standard chain gage on the toll bridge. The original gage was a vertical staff attached to an oak tree on the right bank about 100 feet above the bridge. A chain gage, established March 14, 1903, was read in connection with the vertical gage until June 28, 1905, when the present gage was installed. The datum of the vertical staff gage originally used and that of the present chain gage has not been changed.

Channel.—The right bank is high and overflows only slightly; the left bank will overflow for about 800 feet at a gage height of 16 to 18 feet. The bed of the stream is sandy and changeable, necessitating frequent discharge measurements and occasional changes in the rating.

Discharge measurements.—Made from the downstream side of the bridge.

Artificial control.—Dams near Gainesville, Ga., and on Chestatee River interfere with the natural flow. It is thought that the two readings a day give a good daily mean gage height.

Accuracy.—Except for the possible error in mean gage heights due to artificial control, the results at this station are considered excellent.

Cooperation.—Since May 1, 1910, the gage heights have been furnished by the United States Weather Bureau.

Discharge measurements of Chattahoochee River near Norcross, Ga., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 15	M. R. Hall	2.36	1,340	Sept. 29	M. R. Hall	1.68	767
Apr. 13	do	6.36	5,360	29	R. E. Robertson	1.68	803
13	do	6.30	5,370				

Daily gage height, in feet, of Chattahoochee River near Norcross, Ga., for 1911.

[W. O. Medlock, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.4	2.4	2.5	2.6	3.3	2.45	2.0	2.0	1.9	1.25	2.2	2.5
2	3.0	2.45	2.6	2.55	3.35	2.35	2.2	2.6	1.8	1.02	2.2	2.4
3	7.8	2.3	2.55	2.5	3.55	2.3	1.85	2.9	1.55	1.45	2.0	2.3
4	9.4	2.3	2.25	2.5	3.2	2.3	1.95	5.6	1.6	1.3	2.0	2.3
5	5.2	2.25	2.3	5.6	3.05	2.2	3.0	5.2	1.8	1.8	1.52	2.4
6	3.8	1.8	2.3	11.0	3.05	2.2	2.3	3.2	2.5	1.35	1.9	2.3
7	3.4	2.45	2.35	6.4	3.0	2.2	2.1	2.6	3.4	1.4	5.0	2.4
8	3.15	2.35	2.4	8.6	2.9	2.2	2.4	2.5	2.2	1.35	3.8	2.4
9	3.1	2.65	2.3	8.6	2.85	2.2	2.5	2.2	2.0	1.2	6.9	2.0
10	3.0	2.8	2.3	6.2	2.85	2.15	2.0	2.0	1.85	2.8	6.0	2.1
11	2.7	2.8	2.3	4.8	2.75	2.1	2.6	1.9	1.5	6.6	3.6	1.7
12	2.7	3.0	2.2	5.1	2.75	2.05	2.4	1.9	1.9	3.3	3.0	2.3
13	2.6	2.95	2.2	6.4	2.65	2.0	2.2	1.7	1.9	2.6	2.9	2.2
14	2.5	2.8	2.2	5.8	2.6	1.95	2.4	1.8	1.8	2.2	2.9	2.1
15	2.45	2.75	2.2	5.6	2.6	1.95	3.0	1.9	1.7	1.95	2.7	2.4
16	2.4	2.7	2.15	4.8	2.6	1.9	3.4	1.85	1.55	1.55	2.6	2.5
17	2.4	2.55	2.2	4.3	2.55	1.88	4.0	1.9	1.6	3.9	2.5	2.7
18	2.4	2.6	2.15	4.0	2.5	1.95	3.8	1.85	1.35	7.4	2.6	2.7
19	2.5	2.3	2.1	3.8	2.55	2.5	2.5	1.95	1.4	4.3	2.7	2.6
20	2.4	3.1	2.8	4.4	2.55	2.95	2.2	1.9	1.6	2.9	2.7	2.5
21	2.3	3.2	2.85	4.0	2.8	2.4	2.2	1.7	1.6	2.6	2.5	2.9
22	2.3	2.9	2.45	3.65	3.0	2.4	2.2	1.75	1.7	2.5	2.4	5.4
23	2.35	2.8	2.3	3.5	3.3	2.15	2.2	1.65	1.7	2.5	2.3	11.2
24	2.3	2.55	2.25	3.35	3.5	2.05	2.3	1.65	1.6	2.6	2.3	6.4
25	2.35	2.5	2.2	3.25	3.25	2.1	2.6	1.7	1.35	2.3	2.5	4.8
26	2.3	2.25	2.5	3.15	2.8	2.0	2.5	1.6	1.55	2.1	2.3	4.2
27	2.3	2.3	4.4	3.15	2.6	1.95	2.0	1.55	1.65	2.1	2.2	5.0
28	2.15	2.5	4.3	3.2	2.5	1.88	1.9	1.48	1.75	2.2	2.4	5.6
29	2.1	.....	3.2	3.4	2.6	2.1	1.85	1.7	1.55	2.0	2.7	4.0
30	2.2	.....	3.0	3.55	2.6	1.98	1.72	1.75	1.22	1.5	2.8	3.6
31	2.4	.....	2.8	.....	2.5	.....	1.8	1.8	.....	1.9	.....	4.0

Daily discharge, in second-feet, of Chattahoochee River near Norcross, Ga., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,320	1,320	1,400	1,480	2,070	1,360	1,000	1,000	925	455	1,160	1,400
2	1,800	1,360	1,480	1,440	2,120	1,280	1,160	1,480	850	294	1,160	1,320
3	7,370	1,240	1,440	1,400	2,300	1,240	888	1,720	665	595	1,000	1,240
4	9,700	1,240	1,200	1,400	1,980	1,240	962	4,470	700	490	1,000	1,240
5	3,990	1,200	1,240	4,470	1,840	1,160	1,800	3,990	850	850	644	1,320
6	2,520	850	1,240	12,100	1,840	1,160	1,240	1,980	1,400	525	925	1,240
7	2,160	1,360	1,280	5,470	1,800	1,160	1,080	1,480	2,160	560	3,750	1,320
8	1,940	1,280	1,320	8,500	1,720	1,160	1,320	1,400	1,160	525	2,520	1,320
9	1,890	1,520	1,240	8,500	1,680	1,160	1,400	1,160	1,000	420	6,120	1,000
10	1,800	1,640	1,240	5,210	1,680	1,120	1,000	1,000	888	1,640	4,950	1,080
11	1,560	1,640	1,240	3,530	1,600	1,080	1,480	925	630	5,730	2,340	775
12	1,560	1,800	1,160	3,870	1,600	1,040	1,320	925	925	2,070	1,800	1,240
13	1,480	1,760	1,160	5,470	1,520	1,000	1,160	775	925	1,480	1,720	1,160
14	1,400	1,640	1,160	4,710	1,480	962	1,320	850	850	1,160	1,720	1,080
15	1,360	1,600	1,160	4,470	1,480	962	1,800	925	775	962	1,560	1,320
16	1,320	1,560	1,120	3,530	1,480	925	2,160	888	665	665	1,480	1,400
17	1,320	1,440	1,160	3,000	1,440	910	2,700	925	700	2,610	1,400	1,560
18	1,320	1,480	1,120	2,700	1,400	962	2,520	888	525	6,810	1,480	1,560
19	1,400	1,240	1,080	2,520	1,440	1,400	1,400	962	560	3,000	1,560	1,480
20	1,320	1,890	1,640	3,100	1,440	1,760	1,160	925	700	1,720	1,560	1,400
21	1,240	1,980	1,680	2,700	1,640	1,320	1,160	775	700	1,480	1,400	1,720
22	1,240	1,720	1,360	2,380	1,800	1,320	1,160	812	775	1,400	1,320	4,230
23	1,280	1,640	1,240	2,250	2,070	1,120	1,160	738	775	1,400	1,240	12,400
24	1,240	1,440	1,200	2,120	2,250	1,040	1,240	738	700	1,480	1,240	5,470
25	1,280	1,400	1,160	2,020	2,020	1,080	1,480	775	525	1,240	1,400	3,530
26	1,240	1,200	1,400	1,940	1,640	1,000	1,400	700	665	1,080	1,240	2,900
27	1,240	1,240	3,100	1,940	1,480	962	1,000	665	738	1,080	1,160	3,750
28	1,120	1,400	3,000	1,980	1,400	910	925	616	812	1,160	1,320	4,470
29	1,080	.....	1,980	2,160	1,480	1,080	888	775	665	1,000	1,560	2,700
30	1,160	.....	1,800	2,300	1,480	985	790	812	434	630	1,640	2,340
31	1,320	.....	1,640	.....	1,400	.....	850	850	.....	925	.....	2,700

NOTE.—Daily discharge computed from a rating curve well defined below 8,000 second-feet and fairly well defined below 15,000 second-feet.

Monthly discharge of Chattahoochee River at Norcross, Ga., for 1911.

[Drainage area, 1,170 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	9,700	1,080	2,000	1.71	1.97	A.
February	1,980	850	1,470	1.26	1.31	A.
March	3,100	1,080	1,440	1.23	1.42	A.
April	12,100	1,400	3,620	3.09	3.45	A.
May	2,300	1,400	1,700	1.45	1.67	A.
June	1,760	910	1,130	.966	1.08	A.
July	2,700	790	1,320	1.13	1.30	A.
August	4,470	616	1,190	1.02	1.18	A.
September	2,160	434	821	.702	.78	A.
October	6,810	294	1,470	1.26	1.45	A.
November	6,120	644	1,780	1.52	1.70	A.
December	12,400	775	2,310	1.97	2.27	A.
The year	12,400	294	1,690	1.44	19.58	

CHATTAHOOCHEE RIVER AT WEST POINT, GA.

Location.—At the Montgomery Street Bridge, West Point, Ga., half a mile below the mouth of Oseligee Creek and about 3 miles above Long Cane Creek.

Records available.—July 30, 1896, to December 31, 1911.

Drainage area.—3,300 square miles.

Gage.—Standard chain gage attached to the highway bridge; datum unchanged.

Channel.—Deep; current sluggish at low stages. Bottom shifts considerably, but the shifting does not affect discharge rating. The right bank is high and overflows only at high water, when most of the town is flooded; the left bank is somewhat lower and overflows for about 800 feet at a gage height of 20 feet.

Discharge measurements.—Made from the downstream side of the highway bridge.

Artificial control.—Some fluctuations are caused by the operation of power plants above, mainly the Bull Sluice plant near Atlanta, Ga., but these are of little consequence compared to the backwater from the Langdale Dam 4 miles below. The height of the dam was raised in 1909, but the effect was fairly well cared for in the records of 1909 and 1910. During the low water of 1911, however, with increased height of flashboards, the backwater effect, varying with the use of water at Langdale, was so great that reasonably good estimates of flow can not be made.

Accuracy.—Discharge rating is not reliable (see "Artificial control") and no discharge estimates are given for 1911.

Discharge measurements of Chattahoochee River at West Point, Ga., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Feb. 18	M. R. Hall	3.58	4,190
18	do	3.57	3,980
Apr. 6	do	8.18	14,100
7	do	8.49	15,100

CHATTAHOOCHEE RIVER AT ALAGA, ALA.

Location.—At the Atlantic Coast Line Railway bridge one-fourth mile east of Alaga, 4 miles east of Gordon, and half a mile west of Saffold, Ga., about 35 miles above the junction of Chattahoochee and Flint rivers.

Records available.—Gage heights from January 1, 1908, to December 31, 1911.

Drainage area.—8,780 square miles (United States Weather Bureau figures).

Gage.—Standard chain gage attached to the railroad bridge; datum unchanged since 1908.

Channel.—Shifting; lack of conformity in discharge measurements indicates much change.

Discharge measurements.—Made from the railroad bridge.

Accuracy.—No rating has yet been developed.

Cooperation.—The gage heights have been furnished by the United States Weather Bureau.

The following discharge measurement was made by R. E. Robertson:
October 21, 1911: Gage height, 2.33 feet; discharge, 4,780 second-feet.

Daily gage height, in feet, of Chattahoochee River at Alaga, Ala., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.0	3.4	3.9	6.5	4.6	2.2	2.1	1.4	0.9	0.4	3.0	2.9
2	4.4	3.3	3.7	5.4	4.8	2.0	1.9	1.1	.8	.5	2.3	3.0
3	4.7	3.3	3.5	4.4	5.4	1.8	1.8	2.5	.8	.1	1.5	2.6
4	11.9	3.3	3.4	3.9	6.9	1.7	1.7	8.1	.7	− .4	1.8	2.8
5	18.2	3.0	3.3	3.7	5.7	1.7	1.8	10.1	1.1	− .1	1.6	2.4
6	18.5	3.0	3.3	5.5	4.9	1.6	2.0	6.8	1.3	.2	1.6	2.1
7	16.1	3.1	3.3	8.2	4.4	1.8	2.3	5.5	2.4	.1	1.2	2.1
8	13.2	3.6	3.4	12.8	4.0	1.8	3.0	4.5	2.8	− .3	1.4	2.1
9	9.8	4.6	3.1	13.7	3.6	1.4	2.8	5.3	2.5	− .6	2.1	2.0
10	7.4	5.2	3.2	15.3	3.6	1.2	2.7	4.2	2.4	− .6	3.2	1.7
11	6.8	4.6	3.1	15.0	3.3	1.2	2.5	3.5	1.6	− .5	7.6	1.7
12	5.9	5.6	3.1	16.2	3.2	1.3	3.4	2.9	1.4	.1	10.8	1.5
13	5.5	7.6	2.9	14.9	2.9	1.1	3.3	2.4	1.5	1.2	9.4	1.6
14	5.1	10.1	3.4	12.3	2.7	1.1	2.9	2.3	1.4	.0	8.2	1.9
15	4.8	10.5	7.0	10.3	2.5	1.4	5.1	2.2	1.2	.2	5.8	1.9
16	4.5	8.2	3.0	9.0	.....	1.1	6.2	2.2	1.0	3.5	3.9	2.9
17	4.4	6.8	2.8	8.7	2.6	.7	7.0	2.6	.9	2.3	3.0	2.9
18	4.3	6.1	2.7	8.0	2.6	.7	6.8	1.8	.6	2.2	3.0	2.6
19	4.0	5.3	2.5	7.4	2.5	.7	8.4	2.0	.2	1.9	2.8	2.3
20	3.8	4.8	2.6	7.1	2.5	.8	8.8	3.8	− .3	2.0	2.3	1.9
21	3.6	5.4	2.5	7.5	2.5	.8	8.9	4.7	.6	2.2	2.2	4.6
22	3.8	5.6	2.8	8.1	2.4	1.1	7.4	3.6	1.3	4.6	2.4	7.7
23	3.7	6.0	3.2	7.6	2.5	2.0	5.7	2.6	1.8	5.4	2.6	20.3
24	3.5	5.2	3.2	6.0	3.9	3.5	4.8	2.0	1.5	3.6	2.2	25.0
25	3.5	4.8	3.3	5.7	4.7	3.0	4.7	1.4	1.3	3.1	2.0	22.1
26	3.7	4.5	3.5	5.1	5.9	2.2	3.9	1.0	.7	1.7	2.3	20.1
27	3.6	4.2	6.7	4.6	5.0	1.6	3.1	.9	.2	1.3	1.6	17.3
28	3.5	3.9	6.6	4.4	4.1	1.7	2.3	.9	.4	1.4	1.9	13.7
29	3.4	.....	11.1	4.4	3.5	2.3	2.3	.8	.7	1.5	3.1	11.9
30	3.2	.....	8.9	4.6	2.9	2.3	2.1	.4	.4	3.4	4.4	11.0
31	3.2	.....	7.1	.....	2.7	.....	1.8	.5	.....	2.3	.....	9.7

FLINT RIVER NEAR WOODBURY, GA.

Location.—At the Macon & Birmingham Railroad bridge, 3 miles east of Woodbury, Ga., about one-third of a mile above the mouth of Cane Creek and one-fourth of a mile below Elkins Creek.

Records available.—March 29, 1900, to December 31, 1911.

Drainage area.—1,090 square miles.

Gage.—Vertical staff, in two sections, on the left bank about 300 feet above the railroad bridge. The datum of the gage, which is 660 feet above sea level, has remained the same since the establishment of the station.

Channel.—The bottom is rough, consisting chiefly of rock, and currents are irregular. Above gage height 10 feet the banks are subject to overflow for a width of about 350 feet, but all water passes beneath the bridge and its approaches.

Discharge measurements.—Made from the downstream side of the railroad bridge, which does not make a right angle with the current.

Artificial control.—Power developments on tributary streams above affect the daily flow at low stages.

Accuracy.—Since July 1, 1910, the records are based on one gage-height reading a day, and as the operation of the power plants above causes some diurnal fluctuation the estimates of daily discharge may be considerably in error for individual days, especially at low stages. The discharge rating was fairly constant for a number of years but changed considerably in 1909 and 1910, probably due to conditions at the shoals one-half mile below. The highway bridge built a short distance below the gage in September, 1911, materially affected the conditions of flow and necessitated a new discharge rating.

Cooperation.—Since July 1, 1910, the gage heights have been furnished by the United States Weather Bureau.

The following discharge measurement was made by R. E. Robertson:

Daily gage height, in feet, of Flint River near Woodbury, Ga., for 1911.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	0.9	1.0	0.9	0.3	0.2	0.6	0.1	0.0	1.2	0.7
2	0.7	.9	.9	1.2	.2	.2	2.9	.1	−.2	1.0	.7
3	.8	.9	.8	1.0	.2	.0	4.6	.1	−.2	.7	.7
4	.8	.8	.8	.9	.2	.0	3.7	.0	−.2	.6	.6
5	.8	.8	.9	.7	.2	.0	2.3	.1	−.2	.5	.6
6	.8	.8	2.4	.7	.1	.7	1.8	.5	−.2	.5	.6
7	1.0	.8	2.9	.6	.1	.3	.9	.5	−.3	.7	.6
8	1.1	.8	2.7	.6	.3	.3	.7	.5	−.4	.9	.6
9	1.1	.8	2.0	.6	.1	.7	.7	.4	−.4	2.1	.6
10	1.5	.8	2.1	.5	.1	.4	.7	.2	−.4	2.5	.6
11	1.6	.8	2.3	.5	.1	.5	.6	.1	−.1	2.9	.6
12	2.3	.7	2.0	.5	.0	.6	.6	.0	.1	2.7	.6
13	2.5	.7	2.2	.4	.1	.6	.6	.0	.4	1.8	.6
14	2.4	.7	2.1	.4	.0	1.2	.6	.0	.3	1.5	.6
15	2.2	.7	1.8	.4	.0	1.2	.6	.2	.2	1.1	.6
16	1.7	.7	1.5	.4	.0	1.5	.4	.1	.1	1.0	.7
17	1.5	.6	1.3	.3	.0	1.8	1.2	.0	.3	.9	.8
18	1.3	.6	1.1	.3	.0	1.6	1.6	.2	.6	.8	.8
19	1.2	.6	1.0	.3	.0	1.6	1.3	.2	.7	.8	.8
20	1.4	.7	1.4	.4	.5	1.4	.8	.5	.9	.8	.8
21	1.5	.9	1.4	.4	.9	.9	.6	.5	.6	.7	2.2
22	1.3	.8	1.2	.5	.8	.7	.5	.2	.7	.7	2.7
23	1.2	.8	1.0	1.0	1.0	.7	.3	.2	.8	.7	4.8
24	1.1	.7	.9	2.1	.6	.7	.5	.1	.7	.6	5.5
25	1.0	.7	.8	1.8	.3	.6	.3	.1	.5	.6	5.0
26	.9	.8	.8	1.2	.2	.5	.2	.2	.4	.6	4.0
27	.9	2.3	.7	.9	.2	.5	.2	.1	.4	.6	3.2
28	.9	2.5	.7	.6	.6	.5	.1	.1	1.1	.7	2.8
29	.....	2.2	.8	.5	.5	.2	.1	.0	1.5	.8	2.5
30	.....	1.7	1.1	.4	.5	.1	.1	.0	1.6	.8	2.0
31	.....	1.3	.....	.3	.....	.1	.1	.....	1.3	.....	1.7

Daily discharge, in second-feet, of Flint River near Woodbury, Ga., for 1911.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	[a] 548	700	785	700	323	279	483	239	203	955	548
2	548	700	700	970	279	279	3,140	239	140	785	548
3	620	700	620	785	279	203	5,820	239	140	548	548
4	620	620	620	700	279	203	4,320	203	140	483	483
5	620	620	700	548	279	203	2,310	239	140	424	483
6	620	620	2,440	548	239	548	1,640	424	140	424	483
7	785	620	3,140	483	239	323	700	424	112	548	483
8	875	620	2,860	483	323	323	548	424	86	700	483
9	875	620	1,900	483	239	548	548	371	86	1,810	483
10	1,280	620	2,040	424	239	371	548	279	86	2,310	483
11	1,400	620	2,310	424	239	424	483	239	170	2,860	483
12	2,310	548	1,900	424	203	483	483	203	239	2,580	483
13	2,580	548	2,180	371	239	483	483	203	371	1,490	483
14	2,440	548	2,040	371	203	970	483	203	323	1,220	483
15	2,180	548	1,640	371	203	970	483	279	279	870	483
16	1,520	548	1,280	371	203	1,280	371	239	239	785	548
17	1,280	483	1,070	323	203	1,640	970	203	323	700	620
18	1,070	483	875	323	203	1,400	1,400	279	483	620	620
19	970	483	785	323	203	1,400	1,070	279	548	620	620
20	1,180	548	1,180	371	424	1,180	620	424	700	620	620
21	1,280	700	1,180	371	700	700	483	424	483	548	1,930
22	1,070	620	970	424	620	548	424	279	548	548	2,580
23	970	620	785	785	785	548	323	279	620	548	5,840
24	875	548	700	2,040	483	548	424	239	548	483	7,150
25	785	548	620	1,640	323	483	323	239	424	483	6,200
26	700	620	620	970	279	424	279	279	371	483	4,500
27	700	2,310	548	700	279	424	279	239	371	483	3,300
28	700	2,580	548	483	483	424	239	239	870	548	2,720
29	.....	2,180	620	424	424	279	239	203	1,220	620	2,310
30	.....	1,520	875	371	424	239	239	203	1,310	620	1,700
31	.....	1,070	.....	323	.....	239	239	.....	1,040	.....	1,400

[a] Estimated.

NOTE.—Daily discharge computed from a rating curve fairly well defined above 200 second-feet.

Monthly discharge of Flint River near Woodbury, Ga., for 1911.

[Drainage area, 1,090 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	.....	.....	[a]1,030	0.945	1.09	C.
February	2,580	548	1,120	1.03	1.07	B.
March	2,580	483	810	.743	.86	B.
April	3,140	548	1,280	1.17	1.30	B.
May	2,040	323	591	.542	.62	B.
June	785	203	328	.301	.34	B.
July	1,640	203	592	.543	.63	B.
August	5,820	239	980	.899	1.04	B.
September	424	203	275	.252	.28	B.
October	1,310	86	411	.377	.43	C.
November	2,860	424	891	.817	.91	B.
December	7,150	483	1,620	1.49	1.72	B.
The year	7,150	86	827	.759	10.29	

[a] Estimated by comparison with other Flint River stations.

FLINT RIVER NEAR CULLODEN, GA.

Location.—At Grays Ferry, 14 miles southwest of Culloden, Ga., 1½ miles above the mouth of Auchumpkee Creek, and about 3 miles above the old gage near Musella, Ga., which was read for a short time in 1907.

Records available.—July 1 to December 31, 1911.

Drainage area.—2,000 square miles.

Gage.—Vertical timber attached to a willow stump on the left bank just below the ferry landing; datum unchanged.

Channel.—Sandy and likely to shift at the station, but a rock ledge one-half mile below will probably give a permanent control.

Discharge measurements.—Made from the ferryboat.

Cooperation.—Gage observer paid by the Central Georgia Power Co.

Discharge measurements of Flint River near Culloden, Ga., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
June 29	M. R. Hall	1.69	512
Sept. 15	R. E. Robertson	1.25	279

NOTE.—Measurements made from boat.

Daily gage height, in feet, of Flint River near Culloden, Ga., for 1911.

[Walter Blasengame, observer.]

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.65	1.4	1.45	1.25	2.7	2.35	16	2.7	1.9	1.55	1.35	2.6	2.4
2	1.4	2.6	1.4	1.2	2.55	2.3	17	3.4	1.2	1.4	1.3	2.55	2.5
3	1.4	6.7	1.5	1.25	2.35	2.25	18	3.2	2.8	1.55	2.4	2.4	2.45
4	1.2	8.1	2.55	1.2	1.9	2.1	19	3.9	3.0	1.7	2.15	2.3	2.4
5	1.2	5.4	1.5	1.1	2.0	2.15	20	3.2	2.7	1.65	1.65	2.35	2.85
6	1.5	3.5	1.6	1.15	1.9	2.05	21	2.7	2.3	1.8	1.5	2.2	5.4
7	2.0	2.7	1.55	1.2	2.4	2.0	22	2.3	2.1	1.75	9.4	2.15	5.9
8	1.6	2.3	1.8	1.0	2.45	1.95	23	2.3	1.8	2.0	5.1	2.0	9.9
9	1.5	2.1	1.7	1.15	3.4	2.0	24	2.3	1.6	1.7	3.4	2.05	9.0
10	2.0	2.8	1.65	1.2	4.2	2.05	25	2.1	1.9	1.65	2.55	2.1	7.8
11	1.9	2.3	1.55	2.1	4.1	2.0	26	2.0	1.7	1.4	2.4	1.9	6.5
12	2.2	2.25	1.4	1.3	4.6	2.0	27	1.8	1.6	1.55	2.0	2.0	5.7
13	2.4	2.4	1.45	1.2	4.5	2.0	28	1.8	1.55	1.45	2.3	2.15	5.0
14	2.4	2.3	1.5	1.15	3.1	2.05	29	1.6	1.5	1.2	3.2	2.2	4.9
15	3.2	2.1	1.6	1.5	2.9	2.1	30	1.6	1.45	1.3	3.4	2.4	4.1
							31	1.55	1.5	.....	3.0	.....	4.6

Daily discharge, in second-feet, of Flint River near Culloden, Ga., for 1911.

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec..
1	504	360	388	282	1,310	1,010	16	1,310	665	444	334	1,220	1,050
2	360	1,220	360	257	1,180	970	17	2,010	257	360	307	1,180	1,130
3	360	6,950	415	282	1,010	930	18	1,790	1,400	444	1,050	1,050	1,090
4	257	9,840	1,180	257	665	810	19	2,580	1,590	534	850	970	1,050
5	257	4,670	415	210	735	850	20	1,790	1,310	504	504	1,010	1,440
6	415	2,120	473	234	665	772	21	1,310	970	598	415	890	4,670
7	735	1,310	444	257	1,050	735	22	970	810	566	13,000	850	5,510
8	473	970	598	165	1,090	700	23	970	598	735	4,200	735	14,200
9	415	810	534	234	2,010	735	24	970	473	534	2,010	772	12,000
10	735	1,400	504	257	2,960	772	25	810	665	504	1,180	810	9,170
11	665	970	444	810	2,830	735	26	735	534	360	1,050	665	6,580
12	890	930	360	307	3,490	735	27	598	473	444	735	735	5,170
13	1,050	1,050	388	257	3,350	735	28	598	444	388	970	850	4,050
14	1,050	970	415	234	1,690	772	29	473	415	257	1,790	890	3,910
15	1,790	810	473	415	1,490	810	30	473	388	307	2,010	1,050	2,830
							31	444	415	.....	1,590	.....	3,490

NOTE.—Daily discharge computed from a rating curve fairly well defined below 2,700 second-feet. Above 6,000 second-feet the estimates are only approximate.

Monthly discharge of Flint River near Culloden, Ga., for 1911.

[Drainage area 2,000 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
July	2,580	257	896	0.448	0.52	A.
August	9,840	257	1,480	.740	.85	B.
September	1,180	257	479	.240	.27	A.
October	13,000	165	1,180	.590	.68	B.
November	3,490	665	1,310	.655	.73	B.
December	14,200	700	2,880	1.44	1.66	C.

FLINT RIVER NEAR MONTEZUMA, GA.

Location.—At the iron highway bridge about 1 mile west of Montezuma. This is the second, or upper, wagon bridge. It is above the mouth of Bucks Creek.

Records available.—October 1, 1904, to December 31, 1911.

Drainage area.—2,700 square miles.

Gage.—Chain gage attached to the upstream side of the bridge; datum unchanged.

Channel.—The right bank will overflow for a great distance at a stage of about 12 feet. The overflowed portion is largely covered with a dense growth of brush. The left bank is not liable to overflow. The current toward the left bank becomes sluggish at low stages, and at times there is considerable back current near the bank. The bottom is somewhat shifting.

Discharge measurements.—Made from the downstream side of the highway bridge.

Artificial control.—The flow is not appreciably affected by artificial control.

Accuracy.—A fairly good rating has been developed, but gage heights are very uncertain and the data should be used with caution.

Cooperation.—Gage heights are furnished by the United States Weather Bureau.

Discharge measurements of Flint River near Montezuma, Ga., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
July 25	M. R. Hall	2.98	1,690
26	R. E. Robertson	2.74	1,610
Oct. 25	do	9.30	6,080
Dec. 9	do	2.47	1,340

Daily gage height, in feet, of Flint River near Montezuma, Ga., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.0	3.2	3.1	5.7	3.0	1.9	1.6	1.3	1.4	0.9	4.7	3.6
2	5.4	3.0	3.3	4.4	3.2	1.7	1.6	1.5	1.4	.8	4.2	3.3
3	5.9	3.4	3.0	3.8	3.5	1.7	1.3	4.3	1.3	.8	3.8	3.1
4	6.2	3.7	2.8	3.5	4.0	1.5	1.3	7.0	1.3	.7	3.3	2.9
5	5.7	4.1	2.5	3.4	3.5	1.6	1.7	8.3	1.6	.7	2.9	2.9
6	5.3	4.4	2.4	3.7	3.1	1.8	1.7	9.3	2.2	.6	2.6	2.6
7	5.0	4.9	2.2	5.3	2.8	1.6	1.4	9.2	1.7	.6	2.7	2.6
8	5.7	4.6	2.5	6.6	2.5	1.5	1.7	5.1	1.8	.6	3.2	2.5
9	6.2	5.1	2.8	7.5	2.4	1.3	1.7	3.5	1.9	.6	3.6	2.5
10	5.6	5.7	3.0	7.6	2.3	1.3	1.5	3.0	1.4	.5	4.6	2.4
11	4.9	5.9	3.3	7.0	2.2	1.5	1.8	5.0	1.6	.6	6.1	2.4
12	4.3	6.2	3.1	6.7	2.2	1.3	2.4	3.7	1.4	1.1	6.5	2.4
13	4.0	6.5	2.8	7.0	2.1	1.3	2.5	3.2	1.2	1.5	6.8	2.4
14	3.6	6.7	3.0	7.1	2.0	1.3	2 6	3.0	1.1	1.3	6.6	2.4
15	3.9	6.3	2.7	6.9	2.0	1.1	3.4	3.0	1.0	1.2	5.3	2.4
16	3.5	5.8	2.9	6.6	2.0	1.0	.....	2.7	1.0	1.2	4.5	3.8
17	3.0	5.3	2.6	5.7	1.8	.9	.....	2.4	.9	1.2	3.9	4.8
18	3.4	5.0	2.5	5.0	1.9	.9	.....	2.5	1.1	2.1	3.4	4.4
19	3.7	4.6	2.3	4.4	1.8	.9	5.2	3.4	1.0	2.7	3.3	4.1
20	3.9	4.1	2.4	4.2	1.7	.8	5.1	4.1	1.4	2.8	3.5	3.7
21	4.2	3.8	2.5	4.2	2.0	1.6	5.0	3.8	1.3	2.3	3.2	4.2
22	4.6	3.5	2.7	4.7	2.7	1.2	4.3	3.0	1.4	2.8	3.0	7.4
23	4.9	3.1	2.8	4.5	3.3	2.1	3.3	2.5	1.9	5.5	2.9	10.4
24	4.6	3.5	2.8	4.0	3.5	2.3	3.2	2.1	1.7	8.2	2.7	11.8
25	4.9	3.2	2.6	3.5	4.6	2.2	3.0	2.0	1.6	9.4	2.7	12.9
26	5.1	3.6	2.7	3.3	5.3	1.9	2.8	2.0	1.6	5.2	2.6	14.1
27	5.5	3.9	3.5	3.1	4.5	1.5	2.3	2.2	1.3	3.3	2.5	13.9
28	5.0	3.5	6.4	3.0	3.5	1.5	2.0	1.7	1.2	3.2	2.7	13.1
29	4.4	.....	8.0	3.0	2.6	1.8	1.8	1.5	1.1	4.2	3.3	12.0
30	4.0	.....	8.3	3.0	2.3	2.1	1.7	1.4	1.0	4.5	3.9	10.6
31	3.6	.....	7.1	.....	2.1	.....	1.5	1.4	.....	4.4	.....	8.9

Daily discharge, in second-feet, of Flint River near Montezuma, Ga., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,810	1,780	1,730	3,270	1,680	1,140	1,020	900	940	740	2,620	1,980
2	3,070	1,680	1,830	2,440	1,780	1,060	1,020	980	940	700	2,320	1,830
3	3,410	1,880	1,680	2,090	1,930	1,060	900	2,380	900	700	2,090	1,730
4	3,620	2,040	1,580	1,930	2,200	980	900	4,210	900	660	1,830	1,630
5	3,270	2,260	1,430	1,880	1,930	1,020	1,060	5,240	1,020	660	1,630	1,630
6	3,000	2,440	1,380	2,040	1,730	1,100	1,060	6,080	1,280	620	1,480	1,480
7	2,810	2,740	1,280	3,000	1,580	1,020	940	6,000	1,060	620	1,530	1,480
8	3,270	2,560	1,430	3,910	1,430	980	1,060	2,880	1,100	620	1,780	1,430
9	3,620	2,880	1,580	4,600	1,380	900	1,060	1,930	1,140	620	1,980	1,430
10	3,200	3,270	1,680	4,680	1,330	900	980	1,680	940	580	2,560	1,380
11	2,740	3,410	1,830	4,210	1,280	980	1,100	2,810	1,020	620	3,550	1,380
12	2,380	3,620	1,730	3,980	1,280	900	1,380	2,040	940	820	3,840	1,380
13	2,200	3,840	1,580	4,210	1,230	900	1,430	1,780	860	980	4,060	1,380
14	1,980	3,980	1,680	4,280	1,180	900	1,480	1,680	820	900	3,910	1,380
15	2,140	3,690	1,530	4,140	1,180	820	1,880	1,680	780	860	3,000	1,380
16	1,930	3,340	1,630	3,910	1,180	780	[a]2,140	1,530	780	860	2,500	2,090
17	1,680	3,000	1,480	3,270	1,100	740	[a]2,410	1,380	740	860	2,140	2,680
18	1,880	2,810	1,430	2,810	1,140	740	[a]2,680	1,430	820	1,230	1,880	2,440
19	2,040	2,560	1,330	2,440	1,100	740	2,940	1,880	780	1,530	1,830	2,260
20	2,140	2,260	1,380	2,320	1,060	700	2,880	2,260	940	1,580	1,930	2,040
21	2,320	2,090	1,430	2,320	1,180	1,020	2,810	2,090	900	1,330	1,780	2,320
22	2,560	1,930	1,530	2,620	1,530	860	2,380	1,680	940	1,580	1,680	4,520
23	2,740	1,730	1,580	2,500	1,830	1,230	1,830	1,430	1,140	3,140	1,630	7,080
24	2,560	1,930	1,580	2,200	1,930	1,330	1,780	1,230	1,060	5,160	1,530	8,450
25	2,740	1,780	1,480	1,930	2,560	1,280	1,680	1,180	1,020	6,160	1,530	9,550
26	2,880	1,980	1,530	1,830	3,000	1,140	1,580	1,180	1,020	2,940	1,480	10,800
27	3,140	2,140	1,930	1,730	2,500	980	1,330	1,280	900	1,830	1,430	10,600
28	2,810	1,930	3,760	1,680	1,930	980	1,180	1,060	860	1,780	1,530	9,750
29	2,440	.....	5,000	1,680	1,480	1,100	1,100	980	820	2,320	1,830	8,650
30	2,200	.....	5,240	1,680	1,330	1,230	1,060	940	780	2,500	2,140	7,270
31	1,980	.....	4,280	.....	1,230	.....	980	940	.....	2,440	.....	5,740

[a] Discharge interpolated by comparison with other Flint River stations.

NOTE.—Daily discharge computed from a rating curve fairly well defined above 1,000 second-feet.

Monthly discharge of Flint River near Montezuma, Ga., for 1911.

[Drainage area, 2,700 square miles.

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	3,620	1,680	2,630	0.974	1.12	B
February	3,980	1,680	2,560	.948	.99	B
March	5,240	1,280	1,950	.722	.83	B
April	4,680	1,680	2,850	1.06	1.18	B
May	3,000	1,060	1,590	.589	.68	B
June	1,330	700	984	.364	.41	C
July	2,940	900	1,510	.559	.64	C
August	6,080	900	2,090	.774	.89	B
September	1,280	740	938	.347	.39	C
October	6,160	580	1,550	.574	.66	C
November	4,060	1,430	2,170	.804	.90	B
December	10,800	1,380	3,840	1.42	1.64	B
The year	10,800	580	2,050	.759	10.33	

FLINT RIVER AT ALBANY, GA.

Location.—At the Dougherty County highway bridge in the city of Albany, 700 feet below the Atlantic Coast Line Railroad bridge.

Records available.—April 10, 1893, to December 31, 1911 (United States Weather Bureau gage heights). Discharge measurements were begun by the Geological Survey in 1901, and estimates of daily discharge have been made from January 1, 1902, to December 31, 1911.

Drainage area.—5,000 square miles.

Gage.—Standard chain gage, installed at the bridge by the United States Geological Survey April 20, 1904. The original staff gage was washed out in 1898. It was again injured in 1902, and on June 18, 1902, a new gage was installed by the United States Weather Bureau at a datum 0.75 foot lower than that of the former gage. The 1902 gage heights, as published by the United States Weather Bureau and the United States Geological Survey, all refer to the new gage datum. The present standard chain gage has the same datum and reads in conformity with the United States Weather Bureau gage.

Channel.—The channel at and below the gage may be slightly shifting, but the control is such that conditions of flow are practically permanent. The river overflows both banks, but only under the approaches to the bridge.

Discharge measurements.—Fairly accurate measurements can be made at the section at the Atlantic Coast Line bridge, although it is very rough, and train switching in the railroad yard interferes with the work. The section at the Georgia Northern Railway bridge, 1 mile above, at which measurements are sometimes made, is considered better, especially for medium and low stages.

Artificial control.—Power developments on Muckalee Creek, which joins Flint River about 2 miles above the station, cause considerable diurnal fluctuation, especially at low stages. It is probable that the flow is also affected by other power plants farther up the river.

Accuracy.—As the records are based on one gage reading a day, made at 7 a. m., it is probable that the estimates of daily discharge are somewhat in error, especially at low stages. The actual daily discharge is probably greater than that indicated by the 7 a. m. reading.

Cooperation.—Gage heights are furnished by the United States Weather Bureau.

Discharge measurements of Flint River at Albany, Ga., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 24	R. E. Robertson	2.55	4,340
Dec. 8	.....do	.90	2,630
8	.....do	1.04	2,750

NOTE.—Measurements made at the Georgia Northern Railway bridge.

Daily gage height, in feet, of Flint River, at Albany, Ga., for 1911.

[D. W. Brosnan, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.6	1.0	1.1	4.9	0.9	0.4	−0.4	−0.4	0.0	−0.5	1.9	1.6
2	1.5	1.0	1.0	3.2	1.1	.3	− .4	.0	.5	− .8	2.0	2.1
3	1.9	1.0	1.0	2.6	1.1	.2	− .1	.3	.1	− .7	2.0	1.4
4	2.5	1.1	1.0	2.1	1.1	− .1	− .2	1.2	− .1	− .7	2.0	1.8
5	2.5	1.3	1.2	1.4	1.0	− .2	− .6	3.3	.1	−1.0	1.5	1.6
6	4.7	1.5	1.5	1.8	1.4	− .2	− .5	4.6	.1	−1.0	.8	1.1
7	5.5	1.2	1.5	1.9	1.1	− .4	− .5	5.5	.0	− .8	1.0	.9
8	6.0	1.0	1.7	2.4	.9	− .2	.0	5.0	.5	−1.0	1.0	.8
9	6.3	1.0	1.8	3.2	.6	.0	.0	4.7	.7	−1.1	1.0	.8
10	7.8	1.2	1.8	4.3	.6	.3	− .1	2.2	.4	−1.1	1.4	.9
11	7.5	1.5	1.4	4.5	.4	.2	.0	.7	.2	−1.1	1.9	.9
12	7.3	1.8	1.2	4.8	.3	− .1	.0	1.2	.3	−1.1	2.4	.8
13	6.1	2.1	.9	4.7	.3	− .2	.0	1.5	.2	−1.0	2.9	.6
14	4.0	2.6	.7	4.7	.3	− .3	.0	1.7	.1	− .5	3.4	.6
15	2.7	3.9	.7	4.6	.3	− .5	.2	1.7	− .1	− .6	3.5	.9
16	2.0	4.7	.6	4.3	.2	− .7	1.0	1.4	− .3	− .8	3.2	1.4
17	1.5	5.6	.5	4.2	− .1	− .8	1.4	1.4	− .5	.0	2.4	2.9
18	1.5	5.2	.3	3.7	− .1	− .8	2.0	1.3	− .7	− .5	2.0	4.8
19	1.4	4.3	.7	3.4	− .3	− .9	2.4	1.9	− .6	.2	1.5	5.0
20	1.4	2.8	1.1	2.5	− .3	−1.0	2.8	1.7	− .6	1.0	1.1	4.6
21	1.3	2.5	1.6	1.9	− .2	−1.0	2.9	1.9	− .4	1.7	1.1	4.6
22	1.3	2.3	1.6	1.8	− .2	− .9	2.5	1.8	− .4	1.5	1.0	5.0
23	1.5	1.8	1.2	2.1	.9	− .1	2.5	1.5	− .2	1.1	1.1	10.7
24	1.7	2.4	.7	2.2	2.3	− .7	2.3	1.4	− .2	2.5	.9	19.0
25	2.1	3.1	.4	1.9	2.5	− .4	1.8	.8	.0	3.5	.7	20.5
26	2.1	2.8	.8	1.7	2.5	.1	1.3	.5	.0	4.4	.7	19.6
27	1.8	2.1	1.4	1.4	2.7	− .3	1.0	.3	.5	5.1	.7	18.5
28	1.5	1.5	1.8	1.3	2.8	− .5	.9	.1	.4	2.9	.7	17.2
29	1.3	.....	2.6	1.2	2.4	− .3	.3	.2	.2	1.8	.8	16.5
30	1.3	.....	4.2	1.0	1.3	.0	.0	.1	− .1	1.3	.6	16.0
31	1.1	.....	4.8	.....	.6	.....	− .4	.0	.....	1.5	.....	14.8

Daily discharge, in second-feet, of Flint River at Albany, Ga., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3,200	2,670	2,760	6,820	2,580	2,170	1,550	1,550	1,850	1,480	3,480	3,200
2	3,110	2,670	2,670	4,860	2,760	2,090	1,550	1,850	2,250	1,280	3,570	3,670
3	3,480	2,670	2,670	4,190	2,760	2,010	1,780	2,090	1,930	1,340	3,570	3,020
4	4,080	2,760	2,670	3,670	2,760	1,780	1,700	2,840	1,780	1,340	3,570	3,380
5	4,080	2,930	2,840	3,020	2,670	1,700	1,410	4,980	1,930	1,160	3,110	3,200
6	6,590	3,110	3,110	3,380	3,020	1,700	1,480	6,480	1,930	1,160	2,500	2,760
7	7,540	2,840	3,110	3,480	2,760	1,550	1,480	7,540	1,850	1,2-0	2,670	2,580
8	8,170	2,670	3,290	3,980	2,580	1,700	1,850	6,940	2,250	1,160	2,670	2,500
9	8,540	2,670	3,380	4,860	2,330	1,850	1,850	6,590	2,420	1,110	2,670	2,500
10	10,400	2,840	3,380	6,130	2,330	2,090	1,780	3,770	2,170	1,110	3,020	2,580
11	10,000	3,110	3,020	6,360	2,170	2,010	1,850	2,420	2,010	1,110	3,480	2,580
12	9,800	3,380	2,840	6,700	2,090	1,780	1,850	2,840	2,090	1,110	3,980	2,500
13	8,300	3,670	2,580	6,590	2,090	1,700	1,850	3,110	2,010	1,160	4,520	2,330
14	5,780	4,190	2,420	6,590	2,090	1,620	1,850	3,290	1,930	1,480	5,100	2,330
15	4,300	5,670	2,420	6,480	2,090	1,480	2,010	3,290	1,780	1,410	5,210	2,580
16	3,570	6,590	2,330	6,130	2,010	1,340	2,670	3,020	1,620	1,280	4,860	3,020
17	3,110	7,670	2,250	6,020	1,780	1,280	3,020	3,020	1,480	1,850	3,980	4,520
18	3,110	7,180	2,090	5,440	1,780	1,280	3,570	2,930	1,340	1,480	3,570	6,700
19	3,020	6,130	2,420	5,100	1,620	1,220	3,980	3,480	1,410	2,010	3,110	6,940
20	3,020	4,410	2,760	4,080	1,620	1,160	4,410	3,290	1,410	2,670	2,760	6,480
21	2,930	4,080	3,200	3,480	1,700	1,160	4,520	3,480	1,550	3,290	2,760	6,480
22	2,930	3,870	3,200	3,380	1,700	1,220	4,080	3,380	1,550	3,110	2,670	6,940
23	3,110	3,380	2,840	3,670	2,580	1,780	4,080	3,110	1,700	2,760	2,760	14,000
24	3,290	3,980	2,420	3,770	3,870	1,340	3,870	3,020	1,700	4,080	2,580	27,000
25	3,670	4,750	2,170	3,480	4,080	1,550	3,380	2,500	1,850	5,210	2,420	30,100
26	3 670	4,410	2,500	3,290	4,080	1,930	2,930	2,250	1,850	6,240	2,420	28,200
27	3,380	3,670	3,020	3,020	4,300	1,620	2,670	2,090	2,250	7,060	2,420	26,100
28	3,110	3,110	3,380	2,930	4,410	1,480	2,580	1,930	2,170	4,520	2,420	23,800
29	2,930	.....	4,190	2,840	3,980	1,620	2,090	2,010	2,010	3,380	2,500	22,600
30	2,930	.....	6,020	2,670	2,930	1,850	1,850	1,930	1,780	2,930	2,330	21,800
31	2,760	.....	6,700	.....	2,330	.....	1,550	1,850	.....	3,110	.....	19,800

NOTE.—Daily discharge computed from a rating curve well defined between 2,000 and 24,000 second-feet and fairly well defined below 48,000 second-feet.

Monthly discharge of Flint River at Albany, Ga., for 1911.

[Drainage area, 5,000 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	10,400	2,760	4,770	0.954	1.10	B.
February	7,670	2,670	3,970	.794	.83	B.
March	6,700	2,090	3,050	.610	.70	B.
April	6,820	2,670	4,550	.910	1.02	B.
May	4,410	1,620	2,640	.528	.61	C.
June	2,170	1,160	1,640	.328	.37	C.
July	4,520	1,410	2,490	.498	.57	C.
August	7,540	1,550	3,320	.664	.77	C.
September	2,420	1,340	1,860	.372	.42	C.
October	7,060	1,110	2,380	.476	.55	C.
November	5,210	2,330	3,220	.644	.72	B.
December	30,100	2,330	9,550	1.91	2.20	B.
The year	30,100	1,110	3,630	.726	9.86	

FLINT RIVER AT BAINBRIDGE, GA.

Location.—At the county wagon bridge half a mile from Bainbridge and about 25 miles above the confluence of Flint and Chattahoochee rivers.

Records available.—October 7, 1904, to December 8, 1911 (Weather Bureau gage-height readings). Discharge measurements were begun by the Geological Survey June 11, 1908, and estimates of daily discharge have been made from January 1, 1908, to December 31, 1911.

Drainage area.—7,410 square miles (United States Weather Bureau).

Gage.—Standard chain gage attached to the highway bridge. The datum has not been changed since June 11, 1908, at which time it was adjusted to its original datum. During part of the time prior to this date the chain was wrongly adjusted. Gage heights for 1908 were all corrected before publication in Water-Supply Paper 242.

Channel.—Bed is soft and likely to shift, but appears to have remained fairly permanent as indicated by constancy of discharge ratings.

Accuracy.—It is possible that daily discharge as determined by one gage-height reading a day may be somewhat in error for individual days; otherwise the accuracy is good for low and medium stages.

Cooperation.—Gage heights are furnished by the United States Weather Bureau.

The following discharge measurement was made by R. E. Robertson:
October 23, 1911: Gage height, 3.04 feet; discharge, 3,630 second-feet.

Daily gage height, in feet, of Flint River at Bainbridge, Ga., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.4	3.8	4.0	6.7	3.8	3.3	2.0	2.4	2.3	1.9	3.7	3.5
2	3.4	3.7	3.9	6.2	3.8	3.0	2.6	2.4	2.3	1.7	3.8	3.4
3	3.6	3.6	3.8	5.7	3.8	2.8	2.5	2.3	2.4	1.5	4.0	3.4
4	4.1	3.6	3.7	5.4	3.8	2.5	2.3	2.3	2.6	1.5	4.2	3.4
5	4.2	3.5	3.6	5.1	3.7	2.4	2.5	2.5	2.5	1.4	4.0	3.3
6	5.1	3.6	3.6	5.2	3.7	2.3	2.5	3.5	2.3	1.3	3.7	3.5
7	6.0	3.6	3.4	5.0	3.7	2.3	2.4	4.4	2.1	1.3	3.2	3.6
8	6.8	3.5	3.4	5.7	3.6	2.4	2.3	6.0	2.5	1.2	3.2	3.3
9	7.7	3.4	3.5	5.8	3.6	2.4	2.3	6.4	2.4	1.2	3.2	3.3
10	8.4	3.7	3.6	5.9	3.1	2.3	2.4	6.4	2.3	1.2	3.3	3.2
11	8.7	3.8	3.6	6.2	3.3	2.2	3.0	5.1	2.3	1.2	3.4	3.1
12	8.6	4.8	3.3	6.8	3.3	2.2	3.0	4.0	2.3	1.3	3.9	3.0
13	7.5	4.2	3.2	7.0	3.4	2.2	3.3	3.9	2.2	1.3	4.3	3.0
14	6.4	4.4	3.3	7.0	3.5	2.1	3.5	4.1	2.2	1.4	4.7	3.0
15	5.7	5.1	3.2	7.1	2.7	2.1	3.6	3.9	2.1	1.4	5.1	3.1
16	5.1	5.5	3.1	6.9	2.7	2.1	3.2	3.0	2.0	1.7	5.3	3.2
17	5.0	6.2	3.1	6.9	2.6	2.0	3.0	3.6	1.9	1.5	5.2	3.5
18	4.9	6.1	3.0	6.7	2.6	1.9	3.6	3.5	1.7	1.5	4.6	4.8
19	4.6	6.0	2.9	6.5	2.6	1.8	4.0	3.5	1.6	1.4	4.2	6.4
20	4.6	5.7	2.9	5.9	2.5	1.6	4.4	3.5	1.6	1.7	3.9	7.3
21	4.4	5.6	3.0	5.5	2.5	1.6	4.9	3.5	1.5	1.7	3.5	7.3
22	4.2	5.2	3.0	5.4	2.5	1.6	5.1	3.6	1.6	1.8	3.5	7.3
23	4.1	4.7	3.1	5.4	2.5	1.7	5.0	4.0	1.7	2.0	3.5	8.0
24	4.0	4.6	3.1	5.3	3.0	1.8	4.7	3.9	1.7	2.8	3.4	13.3
25	4.1	4.8	3.2	5.2	3.5	1.9	4.5	3.3	1.8	3.8	3.4	17.3
26	4.0	4.6	3.2	4.8	3.8	2.0	4.3	3.0	1.8	4.8	3.2	20.3
27	4.1	4.4	3.4	4.6	4.2	2.0	4.0	2.8	1.9	5.3	3.0	21.5
28	4.2	4.3	4.0	4.1	4.4	2.7	3.8	2.6	2.2	5.8	2.8	21.3
29	4.0	.....	4.4	4.0	4.5	2.0	3.3	2.5	2.1	4.6	2.9	20.3
30	4.0	.....	5.4	3.9	4.0	2.0	3.0	2.4	2.0	3.9	3.2	19.5
31	3.8	.....	6.4	.....	3.6	.....	2.6	2.4	.....	3.6	.....	19.0

Daily discharge, in second-feet, of Flint River at Bainbridge, Ga., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3,900	4,170	4,310	6,500	4,170	3,840	3,110	3,310	3,260	3,060	4,100	3,960
2	3,900	4,100	4,240	6,050	4,170	3,660	3,420	3,310	3,260	2,960	4,170	3,900
3	4,030	4,030	4,170	5,610	4,170	3,540	3,360	3,260	3,310	2,860	4,310	3,900
4	4,380	4,030	4,100	5,370	4,170	3,360	3,260	3,260	3,420	2,860	4,450	3,900
5	4,450	3,960	4,030	5,130	4,100	3,310	3,360	3,360	3,360	2,820	4,310	3,840
6	5,130	4,030	4,030	5,210	4,100	3,260	3,360	3,960	3,260	2,780	4,100	3,960
7	5,870	4,030	3,900	5,050	4,100	3,260	3,310	4,590	3,160	2,780	3,780	4,030
8	6,590	3,960	3,900	5,610	4,030	3,310	3,260	5,870	3,360	2,740	3,780	3,840
9	7,480	3,900	3,960	5,690	4,030	3,310	3,260	6,230	3,310	2,740	3,780	3,840
10	8,330	4,100	4,030	5,780	3,720	3,260	3,310	6,230	3,260	2,740	3,840	3,780
11	8,740	4,170	4,030	6,050	3,840	3,210	3,660	5,130	3,260	2,740	3,900	3,720
12	8,600	4,890	3,840	6,590	3,840	3,210	3,660	4,310	3,260	2,780	4,240	3,660
13	7,260	4,450	3,780	6,770	3,900	3,210	3,840	4,240	3,210	2,780	4,520	3,660
14	6,230	4,590	3,840	6,770	3,960	3,160	3,960	4,380	3,210	2,820	4,810	3,660
15	5,610	5,130	3,780	6,860	3,480	3,160	4,030	4,240	3,160	2,820	5,130	3,720
16	5,130	5,450	3,720	6,680	3,480	3,160	3,780	3,660	3,110	2,960	5,290	3,780
17	5,050	6,050	3,720	6,680	3,420	3,110	3,660	4,030	3,060	2,860	5,210	3,960
18	4,970	5,960	3,660	6,500	3,420	3,060	4,030	3,960	2,960	2,860	4,730	4,890
19	4,730	5,870	3,600	6,320	3,420	3,010	4,310	3,960	2,910	2,820	4,450	6,230
20	4,730	5,610	3,600	5,780	3,360	2,910	4,590	3,960	2,910	2,960	4,420	7,060
21	4,590	5,530	3,660	5,450	3,360	2,910	4,970	3,960	2,860	2,960	3,960	7,060
22	4,450	5,210	3,660	5,370	3,360	2,910	5,130	4,030	2,910	3,010	3,960	7,060
23	4,380	4,810	3,720	5,370	3,360	2,960	5,050	4,310	2,960	3,110	3,960	7,830
24	4,310	4,730	3,720	5,290	3,660	3,010	4,810	4,240	2,960	3,540	3,900	.....
25	4,380	4,890	3,780	5,210	3,960	3,060	4,660	3,840	3,010	4,170	3,900	.....
26	4,310	4,730	3,780	4,890	4,170	3,110	4,520	3,660	3,010	4,890	3,780	.....
27	4,380	4,590	3,900	4,730	4,450	3,110	4,310	3,540	3,060	5,290	3,660	.....
28	4,450	4,520	4,310	4,380	4,590	3,480	4,170	3,420	3,210	5,690	3,540	.....
29	4,310	.....	4,590	4,310	4,660	3,110	3,840	3,360	3,160	4,730	3,600	.....
30	4,310	.....	5,370	4,240	4,310	3,110	3,660	3,310	3,110	4,240	3,780	.....
31	4,170	.....	6,230	.....	4,030	.....	3,420	3,310	.....	4,030	.....	.....

NOTE.—Daily discharge computed from a rating curve fairly well defined between 3,000 and 15,000 second-feet. The discharge exceeded 16,000 second-feet on days for which estimates are not given.

Monthly discharge of Flint River at Bainbridge, Ga., for 1911.

[Drainage area, 7,410 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	8,740	3,900	5,260	0.710	0.82	A.
February	6,050	3,900	4,700	.634	.66	A.
March	6,230	3,600	4,030	.544	.63	A.
April	6,860	4,240	5,670	.765	.85	A.
May	4,660	3,360	3,900	.526	.61	A.
June	3,840	2,910	3,200	.432	.48	B.
July	5,130	3,110	3,910	.528	.61	A.
August	6,230	3,260	4,070	.549	.63	A.
September	3,420	2,860	3,140	.424	.47	B.
October	5,690	2,740	3,300	.445	.51	B.
November	5,290	3,540	4,170	.563	.63	A.

NOTE.—Monthly estimates are published only for those months during which the gage heights were 12.5 feet and under. When sufficient measurements are obtained to develop the high-water portion of the rating curve the tables will be completed and published in a later report.

CHOCTAWHATCHEE RIVER BASIN.

CHOCTAWHATCHEE RIVER NEAR NEWTON, ALA.

Location.—At the wagon bridge 1 mile west of Newton, Ala., and 1 mile below the railroad crossing at Elba Junction, Ala., about 5 miles below the mouth of West Choctawhatchee River.

Records available.—June 11, 1906, to October 13, 1906; April 22, 1907, to August 22, 1908; October 20, 1911, to December 31, 1911.

Drainage area.—Not determined.

Gage.—Standard chain gage attached to the downstream side of the wagon bridge; datum unchanged. The gage heights during 1906 were taken from a vertical gage near Elba Junction, but they were reduced to agree with the chain gage.

Channel.—Both banks are high and not likely to overflow. Conditions of flow may possibly be affected by dredging of channel.

Discharge measurements.—Made from the wagon bridge.

Artificial control.—Probably some effect from small power plant above.

Accuracy.—There was probably some change in the controlling section during 1911 requiring a revision of the rating. As no rating was developed for the changed conditions, estimates of daily discharge are not given for 1912.

Cooperation.—Gage observer paid by the Alabama Geological Survey.

Discharge measurements of Choctawhatchee River near Newton, Ala., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 20	R. E. Robertson	2.67	319
20	do	2.67	327

Daily gage height, in feet, of Choctawhatchee River near Newton, Ala., for 1911.

[J. M. Hodge, observer.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1	.....	2.7	3.5	11	.....	2.9	2.7	21	2.3	2.4	4.5
2	.....	2.6	3.4	12	.....	2.8	2.9	22	2.7	2.4	4.0
3	.....	2.4	3.4	13	.....	2.7	2.9	23	2.7	2.3	17.4
4	.....	2.3	3.3	14	.....	2.6	2.8	24	2.6	2.4	12.4
5	.....	2.3	3.2	15	.....	2.6	2.7	25	2.6	2.5	7.6
6	.....	2.7	3.0	16	.....	2.5	3.0	26	2.5	2.4	6.7
7	.....	3.1	3.1	17	.....	2.5	3.2	27	2.4	2.6	5.6
8	.....	3.2	3.0	18	.....	2.6	3.6	28	2.3	4.1	5.4
9	.....	3.1	2.8	19	.....	2.5	3.5	29	2.4	4.0	5.3
10	.....	3.0	2.9	20	2.7	2.4	4.0	30	2.5	3.8	5.3
								31	2.4	.....	5.0

PEA RIVER AT PERA, ALA.

Location.—At the Elton wagon bridge, half a mile west of Pera, Ala. It is about 10 miles above the mouth of Flat Creek, and no tributary streams except very small ones come in nearer the station.

Records available.—August 27, 1904, to December 31, 1911.

Drainage area.—1,180 square miles.

Gage.—Standard chain gage attached to the bridge; datum unchanged.

Channel.—In soft rock; nearly permanent.

Discharge measurements.—Made from the downstream side of the wagon bridge to which the gage is attached.

Artificial control.—Power plants on Whitewater Creek, a tributary stream above the station, cause diurnal fluctuations in the low-water flow. The gage is read twice a day to lessen the effect of such fluctuations.

Accuracy.—The estimates of daily discharge may be considerably in error for individual days due to the operation of the power plants above the station.

Cooperation.—Gage observer paid by the Alabama Geological Survey.

Discharge measurements of Pea River at Pera, Ala., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 19	R. E. Robertson	3.00	388
19	.....do	3.03	400

Daily gage height, in feet, of Pea River at Pera, Ala., for 1911.

[W. G. Early, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.0	4.5	4.2	5.0	5.0	2.8	2.8	1.9	2.1	1.7	2.5	4.6
2	5.4	4.4	4.2	4.5	7.0	2.85	2.5	2.5	2.2	1.6	2.4	4.2
3	10.4	4.3	3.95	4.1	7.2	2.55	3.8	3.3	2.2	1.5	2.2	3.8
4	15.0	4.4	4.0	3.9	6.6	2.35	4.1	4.2	1.8	1.6	2.2	3.6
5	12.6	5.0	3.8	5.2	6.0	2.25	3.1	4.2	1.7	1.6	2.1	3.6
6	11.4	4.6	3.75	8.0	5.6	2.1	2.7	3.8	2.0	1.6	2.05	3.4
7	10.4	4.4	3.7	6.6	5.1	2.4	2.4	2.9	2.1	1.6	2.9	3.2
8	9.2	4.3	3.75	5.8	4.7	2.95	2.3	2.8	2.5	1.5	3.4	3.1
9	8.2	4.2	3.6	6.3	4.2	2.9	2.3	2.6	2.8	1.6	3.4	3.0
10	7.9	4.2	3.6	8.8	3.7	2.55	3.0	2.4	2.6	1.5	3.2	3.0
11	7.5	4.2	3.6	7.4	3.45	2.35	3.0	2.4	2.6	1.9	3.2	2.8
12	6.7	4.4	3.5	12.8	3.3	2.1	2.8	2.6	2.8	2.8	2.9	3.0
13	6.2	5.6	3.55	13.0	3.1	2.15	3.3	3.7	2.4	3.1	2.7	2.8
14	5.8	6.0	3.5	10.3	3.15	2.2	2.8	3.8	2.1	2.6	2.8	3.0
15	5.6	5.8	3.45	8.3	2.9	1.95	2.8	4.0	2.0	2.2	2.6	2.9
16	5.4	5.4	4.2	7.3	2.75	2.8	2.5	3.6	2.0	2.0	2.6	3.0
17	5.2	5.2	3.85	6.6	2.65	2.85	3.9	3.5	2.0	2.1	2.5	3.0
18	5.2	5.1	3.7	5.9	2.95	2.3	5.0	3.5	2.1	3.3	2.6	2.8
19	5.0	4.9	3.45	5.5	2.95	1.85	4.5	4.4	2.2	3.1	2.7	3.0
20	4.9	6.0	3.35	9.4	3.0	2.7	4.8	5.6	2.1	2.8	2.6	3.8
21	5.0	8.8	3.5	9.0	3.2	2.8	4.4	4.3	2.0	2.4	2.8	6.7
22	4.8	6.8	3.65	7.4	3.2	2.85	4.2	4.1	2.0	3.3	2.6	8.4
23	4.8	5.6	4.0	6.3	3.05	2.6	3.7	3.6	1.9	4.1	2.4	21.8
24	4.8	5.2	4.3	5.6	3.15	3.15	3.6	3.0	1.9	3.6	2.4	20.6
25	4.6	5.0	4.4	5.2	3.75	2.65	3.1	2.8	1.8	3.2	2.6	15.5
26	4.6	4.7	5.9	4.7	3.4	2.65	3.0	2.6	1.8	2.8	2.4	12.9
27	4.7	4.4	11.9	4.5	2.95	2.3	2.7	2.4	1.9	2.6	2.4	11.4
28	4.8	4.2	10.6	5.0	2.75	3.0	2.3	2.0	1.8	2.5	4.6	10.4
29	4.8	.....	8.0	5.2	2.6	3.15	2.2	2.0	1.8	2.6	6.4	8.9
30	4.6	.....	6.4	4.8	2.4	2.7	2.1	2.3	1.7	2.4	5.4	8.4
31	4.6	.....	5.6	.....	2.3	.....	1.9	2.2	.....	2.5	.....	14.0

Daily discharge, in second-feet, of Pea River at Pera, Ala., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,160	715	644	850	850	362	362	224	252	197	310	741
2	965	691	644	715	1,510	372	310	310	266	184	295	644
3	2,930	667	589	622	1,590	318	556	457	266	171	266	556
4	5,050	691	600	578	1,360	288	622	644	210	184	266	515
5	3,950	850	556	906	1,160	273	419	644	197	184	252	515
6	3,390	741	546	1,900	1,030	252	344	556	238	184	245	476
7	2,930	691	535	1,360	878	295	295	381	252	184	381	438
8	2,400	667	546	1,090	767	390	280	362	310	171	476	419
9	1,980	644	515	1,260	644	381	280	326	362	184	476	400
10	1,860	644	515	2,230	535	318	400	295	326	171	438	400
11	1,700	644	515	1,660	486	288	400	295	326	224	438	362
12	1,400	691	495	4,040	457	252	362	326	362	362	381	400
13	1,220	1,030	505	4,130	419	259	457	535	295	419	344	362
14	1,090	1,160	495	2,890	428	266	362	556	252	326	362	400
15	1,030	1,090	486	2,020	381	231	362	600	238	266	326	381
16	965	965	644	1,620	353	362	310	515	238	238	326	400
17	906	906	567	1,360	335	372	578	495	238	252	310	400
18	906	878	535	1,120	390	280	850	495	252	457	326	362
19	850	822	486	995	390	217	715	691	266	419	344	400
20	822	1,160	466	2,490	400	344	794	1,030	252	362	326	556
21	850	2,230	495	2,310	438	362	691	667	238	295	362	1,400
22	794	1,430	525	1,660	438	372	644	622	238	457	326	2,060
23	794	1,030	600	1,260	410	326	535	515	224	622	295	8,180
24	794	906	667	1,030	428	428	515	400	224	515	295	7,630
25	741	850	691	906	546	335	419	362	210	438	326	5,280
26	741	767	1,120	767	476	335	400	326	210	362	295	4,080
27	767	691	3,620	715	390	280	344	295	224	326	295	3,390
28	794	644	3,030	850	353	400	280	238	210	310	741	2,930
29	794	.....	1,900	906	326	428	266	238	210	326	1,290	2,270
30	741	.....	1,290	794	295	344	252	280	197	295	935	2,060
31	741	.....	1,030	.....	280	.....	224	266	.....	310	.....	4,590

NOTE.—Daily discharge computed from a well-defined rating curve.

Monthly discharge of Pea River at Pera, Ala., for 1911.

[Drainage area, 1,180 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	5,050	741	1,490	1.26	1.45	A.
February	2,230	644	889	.753	.78	B.
March	3,620	466	834	.707	.82	B.
April	4,130	578	1,500	1.27	1.42	A.
May	1,590	280	605	.513	.59	B.
June	428	217	324	.275	.31	B.
July	850	224	440	.373	.43	B.
August	1,030	224	450	.381	.44	B.
September	362	197	253	.214	.24	B.
October	622	171	303	.257	.30	B.
November	1,290	245	402	.341	.38	B.
December	8,180	362	1,710	1.45	1.67	A.
The year	8,180	171	767	.650	8.83	

ESCAMBIA RIVER BASIN.

CONECUH RIVER AT BECK, ALA.

Location.—At Simmons Bridge at Beck, about 12 miles below the mouth of Patsaliga Creek, 8 miles west of Andalusia, Ala., a station on the Central of Georgia and Louisville & Nashville railroads.

Records available.—August 24, 1904, to December 31, 1911.

Drainage area.—1,290 square miles.

Gage.—Standard chain gage attached to the upstream side of the wagon bridge; datum unchanged.

Channel.—In soft bedrock and practically permanent. Both banks are subject to overflow at high stages.

Discharge measurements.—Made from the wagon bridge.

Artificial control.—The flow is probably not affected by artificial control but at times may be affected by logging operations.

Accuracy.—Conditions of flow at this station are practically permanent and a good rating has been developed.

Cooperation.—Gage observer paid by the Alabama Geological Survey.

Discharge measurements of Conecuh River at Beck, Ala., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 18	R. E. Robertson	1.71	340
18	....do	1.68	336

Daily gage height, in feet, of Conecuh River at Beck, Ala., for 1911.

[J. F. Hicks, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	3.1	2.9	3.3	4.4	2.2	2.8	2.0	1.4	.....	1.4	2.5
2	.....	3.0	2.8	.....	6.0	1.95	.....	3.2	1.4	1.0	1.3	2.6
3	9.2	3.0	2.8	2.85	5.3	1.9	2.2	3.0	.....	1.0	1.3	.....
4	8.8	3.1	2.7	2.65	5.1	.....	.....	3.1	.....	.9	1.1	2.2
5	8.2	.....	.....	5.4	5.2	1.85	2.1	2.9	1.5	.9	.....	2.1
6	7.6	3.0	2.6	8.6	5.0	3.25	2.0	.....	1.5	.9	1.2	2.0
7	7.4	3.0	2.6	8.4	.....	3.05	1.9	2.7	1.6	.8	2.0	1.9
8	.....	2.9	2.6	7.4	4.8	2.7	1.7	2.6	1.8	.....	1.4	1.9
9	6.9	2.9	2.5	.....	4.0	2.75	.....	2.4	1.9	.75	1.7	1.9
10	6.4	2.9	2.4	9.6	3.45	2.5	2.1	2.0	.....	1.3	1.6	.....
11	5.6	2.9	2.5	9.6	3.05	.....	2.6	1.8	3.0	1.4	1.6	1.8
12	5.1	.....	.....	13.9	2.85	1.95	2.5	2.2	2.1	1.6	.....	1.8
13	4.7	3.5	2.4	14.2	2.7	1.85	2.2	.....	1.9	1.6	1.7	1.7
14	4.3	4.4	2.3	13.5	.....	1.7	2.0	2.8	1.6	1.5	1.7	1.7
15	.....	4.4	2.4	11.5	2.4	1.55	2.2	2.2	1.6	.....	1.6	1.7
16	3.9	4.3	2.4	.....	2.35	1.4	.....	3.2	1.5	1.4	1.6	1.8
17	3.7	4.2	2.3	8.6	2.25	1.75	4.7	3.4	.....	1.7	1.6	.....
18	3.6	3.9	2.3	7.5	2.2	.....	4.2	3.0	1.3	1.7	1.6	1.8
19	3.5	.....	.....	6.1	2.1	1.7	3.1	4.0	1.4	1.5	.....	1.9
20	3.4	5.5	2.5	8.4	2.25	1.75	3.4	.....	1.4	1.5	1.6	2.3
21	3.4	4.4	2.3	9.2	.....	1.95	4.1	3.3	1.5	1.5	1.5	3.3
22	.....	.....	2.5	7.8	2.95	1.9	4.0	3.1	1.6	.....	1.5	3.1
23	3.5	4.0	3.0	.....	2.65	2.05	.....	2.6	1.5	1.5	1.5	9.5
24	3.3	3.7	2.7	6.0	4.0	2.25	2.8	2.3	.....	1.5	1.5	.....
25	3.2	3.5	2.7	5.6	4.1	.....	2.5	2.1	1.4	1.4	1.5	6.7
26	3.2	.....	.....	5.1	4.4	1.9	2.4	2.0	1.4	1.4	.....	6.4
27	3.2	3.1	10.2	4.5	4.6	1.9	2.1	.....	1.3	1.4	1.4	6.2
28	3.3	3.0	6.5	4.4	.....	1.85	2.1	1.6	1.3	1.4	3.2	5.8
29	.....	.....	4.8	4.3	3.0	2.2	1.9	1.5	1.2	.....	2.3	5.7
30	3.2	.....	4.0	.....	.....	3.75	.....	1.5	1.1	1.4	.....	5.3
31	3.2	.....	3.6	.....	2.35	.....	1.6	1.5	.....	1.3	.....	.....

Daily discharge, in second-feet, of Conecuh River at Beck, Ala., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,930	720	650	795	1,260	443	617	395	278	226	278	524
2	2,870	684	617	714	2,050	384	530	757	278	220	262	554
3	3,800	684	617	634	1,680	373	443	684	284	220	262	498
4	3,580	720	585	570	1,590	368	430	720	290	208	233	443
5	3,240	702	570	1,730	1,640	362	418	650	295	208	240	418
6	2,910	684	554	3,470	1,540	776	395	618	295	208	247	395
7	2,810	684	554	3,350	1,490	702	373	585	313	197	395	373
8	2,680	650	554	2,810	1,440	585	332	554	352	194	278	373
9	2,540	650	524	3,420	1,080	601	375	496	373	192	332	373
10	2,270	650	496	4,030	854	524	418	395	528	262	313	362
11	1,830	650	524	4,030	702	454	554	352	684	278	313	352
12	1,590	762	510	6,460	634	384	524	443	418	313	322	352
13	1,400	874	496	6,630	585	362	443	530	373	313	332	332
14	1,210	1,260	469	6,240	540	332	395	617	313	295	332	332
15	1,120	1,260	496	5,100	496	304	443	443	313	286	313	332
16	1,040	1,210	496	4,280	482	278	922	757	295	278	313	352
17	955	1,170	469	3,470	456	342	1,400	834	278	332	313	352
18	914	1,040	469	2,860	443	337	1,170	684	262	332	313	352
19	874	1,410	496	2,100	418	332	720	1,080	278	295	313	373
20	834	1,780	524	3,350	456	342	834	938	278	295	313	469
21	834	1,260	469	3,800	562	384	1,120	795	295	295	295	795
22	854	1,170	524	3,020	667	373	1,080	720	313	295	295	720
23	874	1,080	684	2,540	570	406	848	554	295	295	295	3,970
24	795	955	585	2,050	1,080	456	617	469	286	295	295	3,200
25	757	874	585	1,830	1,120	414	524	418	278	278	295	2,430
26	757	797	2,470	1,590	1,260	373	496	395	278	278	286	2,270
27	757	720	4,360	1,300	1,350	373	418	354	262	278	278	2,160
28	795	684	2,320	1,260	1,020	362	418	313	262	278	757	1,940
29	776	.....	1,440	1,210	684	443	373	295	247	278	469	1,890
30	757	.....	1,080	1,240	583	976	343	295	233	278	496	1,680
31	757	.....	914	.....	482	.....	313	295	.....	262	.....	2,130

NOTE.—Daily discharge computed from a rating curve fairly well defined below 7,000 second-feet. Discharge interpolated for days when gage was not read.

Monthly discharge of Conecuh River at Beck, Ala., for 1911.

[Drainage area, 1,290 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	3,800	757	1,580	1.22	1.41	A.
February	1,780	650	921	.714	.74	A.
March	4,360	469	842	.653	.75	B.
April	6,630	570	2,860	2.22	2.48	A.
May	2,050	418	942	.730	.84	B.
June	976	278	438	.340	.38	B.
July	1,400	313	590	.457	.53	B.
August	1,080	295	562	.436	.50	B.
September	684	233	318	.247	.28	B.
October	332	192	267	.207	.24	B.
November	757	233	326	.253	.28	B.
December	3,970	332	1,000	.775	.89	B.
The year	6,630	192	887	.688	9.32	

MOBILE RIVER BASIN.

OOSTANAULA RIVER AT RESACA, GA.

Location.—At the Western & Atlantic Railroad bridge in Resaca, Ga., 3 miles below the junction of Conasauga and Coosawattee rivers and 1 mile above the mouth of Camp Creek.

Records available.—1891 to 1898 (gage heights by the United States Weather Bureau and discharge measurements and gage heights by the United States Geological Survey). 1899 to 1904, partial records of gage heights; continuous records January 1, 1905, to December 31, 1911.

Drainage area.—1,610 square miles.

Gage.—Heavy vertical timber attached to the downstream side of the bridge pier in the middle of the river; datum unchanged.

Channel.—Slightly shifting at and below the station. The left bank is low and overflows during high water for 480 feet.

Discharge measurements.—Usually made from the downstream side of the railroad bridge, but at times are made from a boat at the ferry about 200 feet above, where the section is somewhat better.

Artificial control.—Except on the smaller tributaries there are very few milldams, and these have little or no effect on the flow at the station. The channel is sometimes obstructed by logs under the left span of the bridge.

Accuracy.—A good rating has been developed for low and medium stages.

Cooperation.—Gage heights are furnished by the United States Weather Bureau.

The following discharge measurement was made by M. R. Hall:

December 12, 1911: Gage height, 2.24 feet; discharge, 747 second-feet.

Daily gage height, in feet, of Oostanaula River at Resaca, Ga., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.8	4.0	5.6	3.6	5.2	3.4	3.0	1.8	1.7	1.3	1.8	2.8
2	9.0	4.2	5.4	3.4	5.6	3.4	2.8	2.0	1.7	1.3	1.8	2.8
3	17.8	4.2	6.0	3.4	5.0	3.4	2.8	3.0	1.7	1.3	1.6	2.6
4	20.0	4.2	5.6	3.6	4.8	3.4	2.8	2.8	1.7	1.2	1.6	2.6
5	18.4	4.6	5.4	8.4	4.6	3.4	3.4	2.6	1.9	1.2	1.5	2.7
6	16.0	4.6	4.6	17.3	4.4	3.4	4.0	2.2	2.0	1.2	1.4	2.7
7	12.6	4.6	4.8	13.7	4.2	3.4	3.8	4.2	2.0	1.2	3.0	2.7
8	6.0	5.0	4.7	11.4	4.0	3.2	3.6	3.8	1.9	1.2	7.3	2.7
9	5.4	9.2	4.7	19.7	4.0	3.2	3.4	3.6	1.7	1.2	5.0	2.6
10	5.3	11.2	4.6	21.2	3.8	3.2	3.4	3.6	1.6	1.2	4.2	2.4
11	5.1	11.4	4.4	19.0	3.8	3.0	4.0	3.2	1.6	4.0	4.2	2.2
12	4.8	13.0	4.2	14.8	3.8	3.0	4.0	3.0	1.6	2.4	4.0	2.2
13	4.6	9.6	4.0	9.6	3.6	2.9	3.8	1.8	1.6	2.0	5.0	2.2
14	4.4	7.0	4.0	4.3	3.6	2.9	4.6	1.8	1.6	1.7	4.9	2.2
15	4.0	6.0	3.8	3.8	3.6	2.8	4.4	1.7	1.6	1.7	4.6	2.7
16	4.0	5.8	3.8	5.2	3.6	2.8	4.2	1.8	1.6	1.7	3.4	2.9
17	3.8	5.6	3.6	6.0	3.4	2.8	4.0	2.0	1.6	6.0	3.2	3.0
18	3.8	5.4	3.4	5.6	3.4	2.8	3.6	2.6	1.6	12.4	3.0	3.3
19	3.7	5.2	3.4	6.0	3.4	2.8	3.2	2.6	1.6	7.0	5.0	3.3
20	3.6	6.0	4.8	11.2	3.6	3.6	2.8	2.4	1.5	4.6	4.1	3.5
21	3.6	8.0	5.2	11.0	3.8	4.2	2.4	2.2	1.5	3.0	3.0	3.8
22	3.6	7.3	4.8	9.3	4.2	4.2	2.2	2.0	1.5	2.4	2.7	5.0
23	3.4	5.3	4.2	6.8	5.8	3.0	3.0	1.9	1.5	2.3	2.6	11.0
24	3.2	5.0	3.8	5.6	8.0	3.0	3.2	1.9	1.5	2.3	2.4	9.8
25	3.0	4.8	3.6	5.4	5.2	3.0	4.0	1.9	1.5	2.2	2.4	8.8
26	3.2	4.8	3.8	5.2	4.5	2.8	3.1	1.8	1.5	2.2	2.4	7.7
27	3.6	5.2	4.8	5.0	3.9	2.8	2.5	1.8	1.4	2.2	2.6	13.0
28	3.8	6.6	6.4	5.0	3.8	3.0	2.3	1.8	1.4	2.0	3.0	13.6
29	3.6	.....	4.4	5.5	3.8	3.4	2.2	1.8	1.4	2.0	3.2	12.5
30	4.0	.....	3.8	5.3	3.6	3.2	1.8	1.7	1.3	2.0	5.2	11.0
31	4.4	.....	3.6	.....	3.4	.....	1.8	1.7	.....	2.0	.....	6.8

Daily discharge, in second-feet, of Oostanaula River at Resaca, Ga., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,350	1,760	2,960	1,500	2,650	1,380	1,140	560	522	390	560	1,030
2	5,870	1,900	2,800	1,380	2,960	1,380	1,030	640	522	390	560	1,030
3	14,400	1,900	3,270	1,380	2,500	1,380	1,030	1,140	522	390	486	920
4	16,600	1,900	2,960	1,500	2,350	1,380	1,030	1,030	522	360	486	920
5	15,000	2,200	2,800	5,330	2,200	1,380	1,380	920	600	360	452	972
6	12,600	2,200	2,200	13,900	2,040	1,380	1,760	726	640	360	420	972
7	9,270	2,200	2,350	10,300	1,900	1,380	1,630	1,900	640	360	1,140	972
8	3,270	2,500	2,270	8,110	1,760	1,260	1,500	1,630	600	360	4,370	972
9	2,800	6,050	2,270	16,300	1,760	1,260	1,380	1,500	522	360	2,500	920
10	2,730	7,920	2,200	17,800	1,630	1,260	1,380	1,500	486	360	1,900	820
11	2,580	8,110	2,040	15,600	1,630	1,140	1,760	1,260	486	1,760	1,900	726
12	2,350	9,660	1,900	11,400	1,630	1,140	1,760	1,140	486	820	1,760	726
13	2,200	6,410	1,760	6,410	1,500	1,080	1,630	560	486	640	2,500	726
14	2,040	4,110	1,760	1,970	1,500	1,080	2,200	560	486	522	2,420	726
15	1,760	3,270	1,630	1,630	1,500	1,030	2,040	522	486	522	2,200	972
16	1,760	3,110	1,630	2,650	1,500	1,030	1,900	560	486	522	1,380	1,080
17	1,630	2,960	1,500	3,270	1,380	1,030	1,760	640	486	3,270	1,260	1,140
18	1,630	2,800	1,380	2,960	1,380	1,030	1,500	920	486	9,070	1,140	1,320
19	1,570	2,650	1,380	3,270	1,380	1,030	1,260	920	486	4,110	2,500	1,320
20	1,500	3,270	2,350	7,920	1,500	1,500	1,030	820	452	2,200	1,830	1,440
21	1,500	4,980	2,650	7,730	1,630	1,900	820	726	452	1,140	1,140	1,630
22	1,500	4,370	2,350	6,140	1,900	1,900	726	640	452	820	972	2,500
23	1,380	2,730	1,900	3,940	3,110	1,140	1,140	600	452	772	920	7,730
24	1,260	2,500	1,630	2,960	4,980	1,140	1,260	600	452	772	820	6,600
25	1,140	2,350	1,500	2,800	2,650	1,140	1,760	600	452	726	820	5,690
26	1,260	2,350	1,630	2,650	2,120	1,030	1,200	560	452	726	820	4,720
27	1,500	2,650	2,350	2,500	1,690	1,030	870	560	420	726	920	9,660
28	1,630	3,770	3,600	2,500	1,630	1,140	772	560	420	640	1,140	10,200
29	1,500	.....	2,040	2,880	1,630	1,380	726	560	420	640	1,260	9,170
30	1,760	.....	1,630	2,730	1,500	1,260	560	522	390	640	2,650	7,730
31	2,040	.....	1,500	.....	1,380	.....	560	522	.....	640	.....	3,940

NOTE.—Daily discharge computed from a rating curve well defined below 7,700 second-feet.

Monthly discharge of Oostanaula River at Resaca, Ga., for 1911.

[Drainage area, 1,610 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	16,600	1,140	3,880	2.41	2.78	A.
February	9,660	1,760	3,660	2.27	2.36	A.
March	3,600	1,380	2,140	1.33	1.53	A.
April	17,800	1,380	5,710	3.55	3.96	A.
May	4,980	1,380	1,960	1.22	1.41	A.
June	1,900	1,030	1,250	.777	.87	A.
July	2,200	560	1,310	.814	.94	A.
August	1,900	522	835	.519	.60	A.
September	640	390	492	.306	.34	A.
October	9,070	360	1,140	.708	.82	A.
November	4,370	420	1,440	.895	1.00	A.
December	10,200	726	2,880	1.79	2.06	A.
The year	17,800	360	2,210	1.37	18.67	

COOSA RIVER AT RIVERSIDE, ALA.

Location.—At the Southern Railway bridge at Riverside, Ala., 1 mile above the mouth of Blue Eye Creek and about 7 miles above Choccolocco Creek.

Records available.—September 25, 1896, to December 31, 1911.

Drainage area.—7,060 square miles.

Gage.—Standard chain gage attached to the right-bank end of the downstream side of the railroad bridge. The original wire gage was located on the downstream side of the bridge near the middle of the river. The gage datum has not been changed since the station was established.

Channel.—For a part of the width the current is broken by a ledge above. Both banks are high and do not overflow, and the bed of the stream is rocky and permanent.

Discharge measurements.—Made from the downstream side of the railroad bridge.

Artificial control.—The flow is not noticeably affected by artificial control at the comparatively few dams above. Four navigation locks have been constructed, the nearest of which is Lock 4, about 4 miles above the station.

Cooperation.—The gage observer is paid by the Alabama Geological Survey.

The following discharge measurement was made by R. E. Robertson:
August 28, 1911: Gage height, 1.10 feet; discharge, 2,480 second-feet.

Daily gage height, in feet, of Coosa River at Riverside, Ala., for 1911.

[J. O. Thompson and J. E. Whitehead, observers.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.0	2.2	2.9	3.85	3.15	1.95	2.0	2.6	1.0	1.0	1.0	1.6
2	3.3	2.1	3.4	3.2	3.15	1.95	1.9	3.2	1.0	1.0	1.0	1.6
3	8.0	2.0	3.8	2.85	3.05	1.85	1.8	4.2	1.0	1.0	1.0	1.6
4	10.0	2.2	3.7	2.65	3.05	1.75	1.8	5.2	1.0	1.0	1.0	1.6
5	12.0	2.2	3.6	3.85	2.95	1.75	1.7	5.3	1.0	1.0	1.0	1.6
6	12.2	2.2	3.5	6.8	2.85	1.75	1.6	4.1	1.2	1.0	1.0	1.6
7	12.0	2.9	3.2	9.4	2.75	1.65	1.6	3.9	1.2	1.0	1.0	1.6
8	10.1	3.1	3.0	10.8	2.55	1.75	1.6	3.1	1.2	1.0	1.1	1.6
9	8.6	3.7	2.7	14.2	2.55	1.65	1.7	2.0	1.0	1.0	3.4	1.5
10	5.9	5.1	2.7	14.5	2.45	1.55	1.8	2.5	1.0	1.0	4.5	1.4
11	4.5	5.8	2.6	14.4	2.45	1.55	1.9	2.8	1.0	1.0	5.4	1.4
12	4.0	6.0	2.6	14.0	2.35	1.55	2.1	2.7	1.0	1.2	4.5	1.4
13	3.6	6.2	2.5	13.6	2.35	1.45	2.5	2.5	1.0	3.0	3.7	1.6
14	3.2	6.9	2.4	13.0	2.25	1.35	2.3	2.4	1.0	3.0	3.2	1.6
15	3.0	7.1	2.4	12.0	2.15	1.25	2.7	2.5	1.0	1.9	3.0	1.7
16	2.9	6.2	2.3	10.1	2.05	1.25	2.6	2.6	1.0	1.3	3.0	1.7
17	2.8	5.2	2.3	8.4	1.95	1.25	3.4	2.6	1.0	1.3	2.8	1.8
18	2.7	4.4	2.2	7.2	1.85	1.15	3.7	2.6	1.0	1.3	2.6	1.9
19	2.6	4.1	2.2	5.6	1.85	1.15	4.6	2.7	1.0	2.2	2.6	2.8
20	2.5	4.1	2.1	5.4	1.75	1.35	3.9	3.3	1.0	4.8	2.6	4.4
21	2.6	4.1	2.2	6.1	1.95	1.75	3.0	2.0	1.0	5.3	2.5	5.5
22	2.5	4.3	2.4	6.8	2.25	1.95	2.8	2.7	1.0	4.2	2.4	6.0
23	2.3	4.7	3.1	6.6	3.55	1.95	2.9	2.5	1.0	2.3	2.4	7.0
24	2.2	4.5	2.9	6.0	3.55	1.75	3.2	2.3	1.0	1.6	2.0	7.8
25	2.2	3.9	2.7	5.1	3.95	1.65	3.5	2.1	1.0	1.4	2.0	8.3
26	2.2	3.5	2.4	4.2	3.75	1.55	3.9	2.0	1.0	1.2	2.0	8.6
27	2.2	3.1	2.9	3.85	3.55	1.45	3.6	1.9	1.0	1.2	2.0	9.6
28	2.1	3.0	3.9	3.7	3.05	1.75	3.2	1.1	1.0	1.2	2.0	10.6
29	2.1	.....	5.0	3.6	2.75	1.95	2.0	1.0	1.0	1.0	1.8	10.8
30	2.2	.....	4.8	3.35	2.25	2.15	2.5	1.0	1.0	1.0	1.8	10.2
31	2.1	.....	4.3	.....	2.05	.....	2.6	1.0	.....	1.0	.....	10.0

Daily discharge, in second-feet, of Coosa River at Riverside, Ala., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4,380	4,900	6,840	9,820	7,600	4,260	4,380	5,970	2,260	2,260	2,260	3,430
2	8,060	4,640	8,380	7,750	7,600	4,260	4,130	7,750	2,260	2,260	2,260	3,430
3	25,600	4,380	9,660	6,690	7,290	4,010	3,890	11,000	2,260	2,260	2,260	3,430
4	34,100	4,900	9,340	6,110	7,290	3,770	3,890	14,500	2,260	2,260	2,260	3,430
5	42,600	4,900	9,020	9,820	6,980	3,770	3,660	14,900	2,260	2,260	2,260	3,430
6	43,400	4,900	8,700	20,600	6,690	3,770	3,430	10,600	2,620	2,260	2,260	3,430
7	42,600	6,840	7,750	31,500	6,400	3,540	3,430	9,980	2,620	2,260	2,260	3,430
8	34,500	7,440	7,140	37,500	5,830	3,770	3,430	7,440	2,620	2,260	2,440	3,430
9	28,100	9,340	6,250	52,000	5,830	3,540	3,660	4,380	2,260	2,260	8,380	3,220
10	17,100	14,200	6,250	53,200	5,560	3,320	3,890	5,700	2,260	2,260	12,000	3,010
11	12,000	16,800	5,970	52,800	5,560	3,320	4,130	6,540	2,260	2,260	15,300	3,010
12	10,300	17,500	5,970	51,100	5,290	3,320	4,640	6,250	2,260	2,620	12,000	3,010
13	9,020	18,300	5,700	49,400	5,290	3,110	5,700	5,700	2,260	7,140	9,340	3,430
14	7,750	21,000	5,420	46,800	5,030	2,910	5,160	5,420	2,260	7,140	7,750	3,430
15	7,140	21,800	5,420	42,600	4,760	2,720	6,250	5,700	2,260	4,130	7,140	3,660
16	6,840	18,300	5,160	34,500	4,510	2,720	5,970	5,970	2,260	2,810	7,140	3,660
17	6,540	14,500	5,160	27,300	4,260	2,720	8,380	5,970	2,260	2,810	6,540	3,890
18	6,250	11,700	4,900	22,300	4,010	2,530	9,340	5,970	2,260	2,810	5,970	4,130
19	5,970	10,600	4,900	16,000	4,010	2,530	12,400	6,250	2,260	4,900	5,970	6,540
20	5,700	10,600	4,640	15,300	3,770	2,910	9,980	8,060	2,260	13,100	5,970	11,700
21	5,970	10,600	4,900	17,900	4,260	3,770	7,140	4,380	2,260	14,900	5,700	15,600
22	5,700	11,300	5,420	20,600	5,030	4,260	6,540	6,250	2,260	11,000	5,420	17,500
23	5,160	12,700	7,440	19,800	8,860	4,260	6,840	5,700	2,260	5,160	5,420	21,400
24	4,900	12,000	6,840	17,500	8,860	3,770	7,750	5,160	2,260	3,430	4,380	24,800
25	4,900	9,980	6,250	14,200	10,100	3,540	8,700	4,640	2,260	3,010	4,380	26,900
26	4,900	8,700	5,420	11,000	9,500	3,320	9,980	4,380	2,260	2,620	4,380	28,100
27	4,900	7,440	6,840	9,820	8,860	3,110	9,020	4,130	2,260	2,620	4,380	32,400
28	4,640	7,140	9,980	9,340	7,290	3,770	7,750	2,440	2,260	2,620	4,380	36,600
29	4,640	.....	13,800	9,020	6,400	4,260	4,380	2,260	2,260	2,260	3,890	37,500
30	4,900	.....	13,100	8,220	5,030	4,760	5,700	2,260	2,260	2,260	3,890	34,900
31	4,640	.....	11,300	.....	4,510	.....	5,970	2,260	.....	2,260	.....	34,100

NOTE.—Daily discharge computed from a well-defined rating curve.

Monthly discharge of Coosa River at Riverside, Ala., for 1911.

[Drainage area, 7,060 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	43,400	4,380	13,300	1.88	2.17	A.
February	21,800	4,380	11,000	1.56	1.62	A.
March	13,800	4,640	7,220	1.02	1.18	A.
April	53,200	6,110	24,300	3.44	3.84	A.
May	10,100	3,770	6,200	.878	1.01	A.
June	4,760	2,530	3,520	.499	.56	A.
July	12,400	3,430	6,110	.865	1.00	A.
August	14,900	2,260	6,380	.904	1.04	A.
September	2,620	2,260	2,300	.326	.36	A.
October	14,900	2,260	4,010	.568	.65	A.
November	15,300	2,260	5,600	.793	.88	A.
December	37,500	3,010	12,600	1.78	2.05	A.
The year	53,200	2,260	8,530	1.21	16.36	

ALABAMA RIVER AT SELMA, ALA.

Location.—At the highway bridge in Selma, Ala.

Records available.—January 1, 1899, to December 31, 1911. The station was originally established by the United States Army Engineer Corps, but in 1890 gage-height records were begun by the United States Weather Bureau. Although it is not thought that the discharge rating can be accurately applied farther back than 1899, flow estimates based on earlier gage heights will probably be of some value.

Drainage area.—15,400 square miles.

Gage.—Standard chain gage was installed by the United States Geological Survey March 22, 1906, on the downstream side of the highway bridge. The United States Weather Bureau gage formerly used was in two sections—the low-water portion, reading from −3 to +5.1 feet, being fastened to the lower side of the cofferdam on the second pier, and the upper portion, reading from 5.1 to 55 feet, being fastened to the draw pier. All gages have had the same datum, but the bad condition of a short low-water section caused some error in the low-water readings prior to 1906, especially those of the year 1904.

Channel.—In soft limestone, deep with swift current and is difficult to sound even at ordinary stages. Both banks are high, but the left is subject to overflow at extreme high water.

Discharge measurements.—Made from the highway bridge to which the gage is attached.

Accuracy.—Conditions of flow are somewhat changeable, but a fairly good rating has been developed for recent years.

Cooperation.—Gage heights are furnished by the United States Weather Bureau.

The following discharge measurement was made by R. E. Robertson:
August 16, 1911: Gage height, 3.10 feet; discharge, 11,100 second-feet.

Daily gage height, in feet, of Alabama River at Selma, Ala., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.6	2.8	6.0	7.7	9.6	2.8	2.5	2.2	−0.5	−0.9	−0.3	2.9
2	4.8	2.9	5.4	6.9	10.4	2.2	1.8	1.8	− .5	−1.1	− .4	3.0
3	10.2	2.9	5.0	6.0	11.9	1.8	1.5	2.2	− .6	−1.2	− .5	2.9
4	20.4	2.7	5.0	5.0	12.4	1.6	1.7	4.5	− .7	−1.3	− .6	2.6
5	26.2	2.7	5.2	4.6	11.3	1.5	1.2	8.1	− .6	−1.2	− .7	2.2
6	28.8	2.8	5.3	6.4	9.3	1.3	.7	8.8	− .4	−1.1	− .7	1.9
7	29.5	2.8	5.3	14.1	7.2	1.1	.3	9.0	.3	−1.2	− .6	1.6
8	28.0	3.3	5.0	18.4	5.8	1.3	.6	7.4	1.4	−1.3	− .4	1.4
9	25.0	4.5	4.7	20.0	5.0	1.9	1.2	5.5	2.1	−1.5	.5	1.2
10	21.3	5.9	4.5	21.4	4.5	1.8	1.3	4.4	1.8	−1.3	1.3	.9
11	17.5	8.5	4.0	23.9	4.1	1.5	.8	3.2	1.3	−1.2	6.2	.7
12	13.4	11.7	3.9	26.4	3.8	1.3	1.3	2.3	.7	−1.0	8.5	.6
13	9.8	14.0	4.0	28.0	3.6	1.2	2.6	1.6	.2	− .9	8.5	.5
14	7.7	16.4	3.8	28.1	3.3	.9	2.9	2.1	.2	−1.0	8.0	.6
15	6.5	17.1	3.6	27.3	3.1	.6	3.8	2.5	− .1	−1.2	7.0	.5
16	5.9	16.2	3.4	25.7	2.8	.4	4.6	3.0	− .3	−1.1	5.5	.7
17	5.4	14.6	3.0	23.7	2.6	.2	4.8	3.2	− .5	1.7	4.3	.9
18	5.0	12.4	2.8	20.7	2.4	.2	5.8	2.6	− .3	1.5	3.7	1.1
19	4.5	10.4	2.7	16.3	2.3	.4	7.3	2.5	− .8	.8	3.5	1.4
20	4.3	7.5	2.7	13.7	2.2	.3	8.9	3.2	− .7	.4	3.4	2.0
21	4.0	9.7	3.0	12.6	2.2	.6	8.9	3.5	− .5	− .1	3.2	3.9
22	3.9	10.8	3.5	12.4	2.4	1.5	8.6	2.9	− .5	2.8	3.1	8.1
23	3.7	10.7	3.5	11.9	3.0	2.2	7.2	2.5	− .4	5.5	3.1	13.1
24	3.5	9.6	3.5	11.7	4.8	2.1	6.4	2.2	− .8	4.9	3.0	17.6
25	3.5	8.8	3.4	11.0	8.0	2.5	6.4	1.6	− .6	3.3	2.9	20.9
26	3.4	8.4	4.0	9.9	8.5	2.4	5.3	1.1	− .9	1.8	2.3	21.4
27	3.3	7.5	4.0	8.6	7.6	2.4	4.3	.8	− .8	.9	1.9	21.0
28	3.0	6.7	4.9	8.1	6.2	2.1	4.6	.4	− .8	.4	1.4	21.3
29	2.9	.....	7.9	9.0	5.3	2.4	4.7	.1	− .6	.1	1.7	22.1
30	2.9	.....	8.2	10.2	4.5	2.3	3.9	− .1	− .7	.1	2.5	22.1
31	2.8	.....	8.0	.....	3.7	.....	2.8	− .3	.....	.0	.....	22.1

Daily discharge, in second-feet, of Alabama River at Selma, Ala., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	10,700	11,100	17,500	21,100	25,400	11,100	10,600	9,980	5,300	4,660	5,620	11,300
2	15,000	11,300	16,200	19,400	27,200	9,980	9,240	9,240	5,300	4,350	5,460	11,500
3	26,800	11,300	15,400	17,500	30,800	9,240	8,700	9,980	5,140	4,200	5,300	11,300
4	52,900	10,900	15,400	15,400	32,000	8,880	9,060	14,400	4,980	4,050	5,140	10,700
5	68,600	10,900	15,800	14,600	29,300	8,700	8,160	22,000	5,140	4,200	4,980	9,980
6	75,800	11,100	16,000	18,300	24,700	8,340	7,290	23,600	5,460	4,350	4,980	9,420
7	77,800	11,100	16,000	36,300	20,000	7,980	6,610	24,000	6,610	4,200	5,140	8,880
8	73,600	12,100	15,400	47,500	17,100	8,340	7,120	20,500	8,520	4,050	5,460	8,520
9	65,300	14,400	14,800	51,800	15,400	9,420	8,160	16,400	9,790	3,750	6,950	8,160
10	55,300	17,300	14,400	55,600	14,400	9,240	8,340	14,200	9,240	4,050	8,340	7,630
11	45,100	22,900	13,400	62,300	13,600	8,700	7,460	11,900	8,340	4,200	17,900	7,290
12	34,400	30,300	13,200	69,100	13,000	8,340	8,340	10,200	7,290	4,500	22,900	7,120
13	25,800	36,000	13,400	73,600	12,600	8,160	10,700	8,880	6,440	4,660	22,900	6,950
14	21,100	42,200	13,000	73,900	12,100	7,630	11,300	9,790	6,440	4,500	21,800	7,120
15	18,600	44,100	12,600	71,600	11,700	7,120	13,000	10,600	5,940	4,200	19,600	6,950
16	17,300	41,700	12,300	67,200	11,100	6,780	14,600	11,500	5,620	4,350	16,400	7,290
17	16,200	37,600	11,500	61,800	10,700	6,440	15,000	11,900	5,300	9,060	14,000	7,630
18	15,400	32,000	11,100	53,700	10,400	6,440	17,100	10,700	5,620	8,700	12,800	7,980
19	14,400	27,200	10,900	42,000	10,200	6,780	20,300	10,600	4,820	7,460	12,400	8,520
20	14,000	20,700	10,900	35,200	9,980	6,610	23,800	11,900	4,980	6,780	12,300	9,600
21	13,400	25,600	11,500	32,400	9,980	7,120	23,800	12,400	5,300	5,940	11,900	13,200
22	13,200	28,100	12,400	32,000	10,400	8,700	23,100	11,300	5,300	11,100	11,700	22,000
23	12,800	27,900	12,400	30,800	11,500	9,980	20,000	10,600	5,460	16,400	11,700	33,700
24	12,400	25,400	12,400	30,300	15,000	9,790	18,300	9,980	4,820	15,200	11,500	45,400
25	12,400	23,600	12,300	28,600	21,800	10,600	18,300	8,880	5,140	12,100	11,300	54,200
26	12,300	22,700	13,400	26,100	22,900	10,400	16,000	7,980	4,660	9,240	10,200	55,600
27	12,100	20,700	13,400	23,100	20,900	10,400	14,000	7,460	4,820	7,630	9,420	54,500
28	11,500	19,000	15,200	22,000	17,900	9,790	14,600	6,780	4,820	6,780	8,520	55,300
29	11,300	.....	21,600	24,000	16,000	10,400	14,800	6,270	5,140	6,270	9,060	57,500
30	11,300	.....	22,200	26,800	14,400	10,200	13,200	5,940	4,980	6,270	10,600	57,500
31	11,100	.....	21,800	.....	12,800	.....	11,100	5,620	.....	6,100	.....	57,500

NOTE.—Daily discharge computed from a well-defined rating curve.

Monthly discharge of Alabama River at Selma, Ala., for 1911.

[Drainage area, 15,400 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	77,800	10,700	28,300	1.84	2.12	A.
February	44,100	10,900	23,200	1.51	1.57	A.
March	22,200	10,900	14,400	.935	1.08	A.
April	73,900	14,600	39,500	2.56	2.86	A.
May	32,000	9,980	16,900	1.10	1.27	A.
June	11,100	6,440	8,720	.566	.63	B.
July	23,800	6,610	13,300	.864	1.00	A.
August	24,000	5,620	11,800	.766	.88	A.
September	9,790	4,660	5,890	.382	.43	B.
October	16,400	3,750	6,560	.426	.49	B.
November	22,900	4,980	11,200	.727	.81	A.
December	57,500	6,950	21,900	1.42	1.64	A.
The year	77,800	3,750	16,800	1.09	14.78	

ETOWAH RIVER NEAR BALL GROUND, GA.

Location.—At the iron wagon bridge about 3 miles southeast of Ball Ground, Ga., and one-fourth mile below the mouth of Longswamp Creek.

Records available.—May 16, 1907, to December 31, 1911.

Drainage area.—466 square miles.

Gage.—A standard chain gage, attached to the upstream side of the bridge, was installed August 18, 1908, replacing the vertical-staff gage, located 75 feet below the bridge. The chain gage was set to read with the vertical staff at low stage, and will differ only very slightly at other stages.

Channel.—The left bank does not overflow, but the right bank overflows about 500 feet beyond the end of the bridge approach at high stages. The current is somewhat broken and is disturbed by rough, rocky bed and curved channel above.

Discharge measurements.—Made from the upstream side of the wagon bridge.

Artificial control.—The operation of a number of mills above may cause slight variations in flow, and on this account the gage is read twice a day.

Accuracy.—The rating is somewhat affected by shifting of the stream bed some distance below the station.

Cooperation.—Gage observer is paid by the Northern Contracting Co.

Discharge measurements of Etowah River near Ball Ground, Ga., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 29	M. R. Hall	3.48	851
Oct. 7	R. E. Robertson	1.85	235
7	....do	1.90	258

Daily gage height, in feet, of Etowah River near Ball Ground, Ga., for 1911.

[R. O. Ellis, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.8	2.6	3.0	3.05	3.7	2.95	2.4	3.0	2.3	1.9	2.5	2.8
2	6.6	2.55	3.15	3.0	3.8	2.8	2.3	3.3	2.2	1.8	2.3	2.75
3	9.6	2.5	2.9	2.9	3.55	2.75	2.4	3.8	2.1	1.9	2.28	2.7
4	6.6	2.8	2.8	3.4	3.5	2.75	2.3	3.8	2.2	1.95	2.35	2.6
5	4.3	2.7	2.7	12.4	3.5	2.7	3.5	3.4	2.3	1.85	2.3	2.7
6	3.7	2.65	2.7	8.8	3.4	2.7	2.5	2.7	3.0	1.8	3.9	2.6
7	3.5	2.7	2.8	5.2	3.4	2.7	2.4	2.7	2.6	1.78	4.6	2.6
8	3.4	2.85	2.9	8.7	3.3	2.6	2.6	2.7	2.2	1.95	4.2	2.55
9	3.25	3.1	2.8	8.1	3.3	2.6	4.0	2.5	2.15	3.2	7.5	2.55
10	3.0	3.2	2.7	5.6	3.25	2.6	3.3	2.4	2.1	10.2	4.5	2.5
11	2.95	3.0	2.7	5.0	3.2	2.6	3.1	2.3	2.3	5.0	3.5	2.5
12	2.9	3.45	2.65	6.0	3.2	2.5	2.8	2.3	2.2	3.0	3.4	2.48
13	2.85	3.25	2.7	5.3	3.15	2.4	3.1	2.25	2.15	2.6	3.3	2.5
14	2.8	3.05	2.7	5.1	3.1	2.4	2.9	2.35	2.1	2.4	3.1	2.45
15	2.8	3.1	2.65	4.85	3.1	2.4	3.4	2.4	2.05	2.4	2.9	2.6
16	2.7	3.0	2.6	4.6	3.1	2.4	3.5	2.3	2.0	2.3	2.8	3.2
17	2.7	2.9	2.6	4.3	3.0	2.5	3.6	2.3	1.9	6.0	2.7	3.0
18	3.0	2.95	2.6	4.1	3.0	2.8	2.7	2.3	2.0	5.2	3.7	2.75
19	2.9	2.9	3.25	4.3	3.05	3.05	2.5	2.95	2.1	3.2	3.2	2.7
20	2.7	4.3	3.9	4.7	3.1	2.8	2.4	2.5	2.0	2.9	2.9	2.9
21	2.7	3.65	3.25	4.1	3.55	2.7	2.5	2.3	2.2	2.7	2.8	3.3
22	2.8	3.2	2.95	3.95	3.3	2.8	2.55	2.2	2.35	3.1	2.75	5.6
23	2.6	3.0	2.9	3.8	3.8	2.55	2.4	2.1	2.2	2.7	2.7	7.3
24	2.55	3.0	2.8	3.7	3.5	2.4	2.55	2.1	2.05	2.55	2.9	5.0
25	2.6	2.9	2.75	3.7	3.2	2.4	3.2	2.1	2.0	2.45	2.8	4.2
26	2.7	2.9	3.8	3.6	3.0	2.4	2.5	2.1	2.15	2.4	2.7	4.1
27	2.6	3.0	4.8	3.6	2.95	2.7	2.4	3.1	2.1	2.45	2.7	5.4
28	2.6	2.9	3.7	3.75	3.15	2.5	2.3	2.5	2.0	2.4	2.95	4.6
29	2.7	.....	3.5	4.0	3.8	2.4	2.3	2.2	1.9	2.4	3.0	4.0
30	2.55	.....	3.3	3.8	3.4	2.4	2.28	2.35	1.85	2.4	2.9	3.7
31	2.5	.....	3.1	.....	3.1	.....	2.55	2.5	.....	2.3	.....	5.5

Daily discharge, in second-feet, of Etowah River near Ball Ground, Ga., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	520	445	600	622	930	580	380	600	350	255	410	520
2	2,820	428	668	600	980	520	350	735	325	235	350	500
3	5,320	410	560	560	855	500	380	980	300	255	345	480
4	2,020	520	520	780	830	500	350	980	325	265	365	445
5	1,250	480	480	7,980	830	480	830	780	350	245	350	480
6	930	462	480	4,610	780	480	410	480	600	235	1,030	445
7	830	480	520	1,810	780	480	380	480	445	231	1,430	445
8	780	540	560	4,520	735	445	445	480	325	265	1,200	428
9	712	645	520	4,020	735	445	1,080	410	312	690	3,530	428
10	600	690	480	2,090	712	445	735	380	300	5,870	1,370	410
11	580	600	480	1,680	690	445	645	350	350	1,680	830	410
12	560	805	462	2,370	690	410	520	350	325	600	780	404
13	540	712	480	1,880	668	380	645	338	312	445	735	410
14	520	622	480	1,740	645	380	560	365	300	380	645	395
15	520	645	462	1,580	645	380	780	380	288	380	560	445
16	480	600	445	1,430	645	380	830	350	275	350	520	690
17	480	560	445	1,250	600	410	880	350	255	2,370	480	600
18	600	580	445	1,140	600	520	480	350	275	1,810	930	500
19	560	560	712	1,250	622	622	410	580	300	690	690	480
20	480	1,250	1,030	1,490	645	520	380	410	275	560	560	560
21	480	905	712	1,140	855	480	410	350	325	480	520	735
22	520	690	580	1,060	735	520	428	325	365	645	500	2,090
23	445	600	560	980	980	428	380	300	325	480	480	3,370
24	428	600	520	930	830	380	428	300	288	428	560	1,680
25	445	560	500	930	690	380	690	300	275	395	520	1,200
26	480	560	980	880	600	380	410	300	312	380	480	1,140
27	445	600	1,550	880	580	480	380	645	300	395	480	1,950
28	445	560	930	955	668	410	350	410	275	380	580	1,430
29	480	.....	830	1,080	980	380	350	325	255	380	600	1,080
30	428	.....	735	980	780	380	345	365	245	380	560	930
31	410	.....	645	.....	645	.....	428	410	.....	350	.....	2,020

NOTE.—Daily discharge computed from a well-defined rating curve.

Monthly discharge of Etowah River near Ball Ground, Ga., for 1911.

[Drainage area, 466 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	5,320	410	868	1.86	2.14	B.
February	1,250	410	611	1.31	1.36	B.
March	1,550	445	625	1.34	1.54	B.
April	7,980	560	1,770	3.80	4.24	A.
May	980	580	741	1.59	1.83	A.
June	622	380	451	.968	1.08	B.
July	1,080	345	518	1.11	1.28	B.
August	980	300	457	.981	1.13	B.
September	600	245	318	.682	.76	B.
October	5,870	231	726	1.56	1.80	B.
November	3,530	345	746	1.60	1.78	B.
December	3,370	395	874	1.88	2.17	B.
The year	7,980	231	726	1.56	21.11	

ETOWAH RIVER NEAR ROME, GA.

Location.—At Freemans Ferry, 5 miles above Rome, Ga., where Etowah and Oostanaula rivers unite to form Coosa River; 1 mile below mouth of Dikes Creek.

Records available.—August 17, 1904, to December 31, 1911.

Drainage area.—1,800 square miles.

Gage.—Vertical gage in three sections, on left bank 250 feet below the ferry; datum unchanged.

Channel.—Both banks are subject to overflow during high water.

Discharge measurements.—Made from the ferry boat or from a small boat held in place by the ferry cable. No measurements can be made at high stages.

Artificial control.—The operation of the few milldams above will seldom affect the flow, but to provide for possible daily fluctuations the gage is read twice a day.

Accuracy.—Conditions of flow are probably permanent, and an excellent rating has been developed for low and medium stages.

Cooperation.—Gage observer is paid by the Northern Contracting Co.

The following discharge measurement was made by R. E. Robertson:
September 2, 1911: Gage height, 1.75 feet; discharge, 913 second-feet.

Daily gage height, in feet, of Etowah River near Rome, Ga., for 1911.

[R. M. Pattillo, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.2	2.1	2.5	2.5	2.9	2.4	2.0	3.2	1.75	1.42	1.75	2.2
2	2.5	2.1	2.55	2.45	2.85	2.3	2.0	3.9	1.75	1.4	1.8	2.1
3	9.7	2.1	2.5	2.4	2.8	2.2	1.9	3.3	2.1	1.4	1.8	2.05
4	11.5	2.2	2.4	3.3	2.7	2.1	1.9	5.0	2.5	1.4	1.75	2.0
5	7.0	2.25	2.35	7.0	2.7	2.05	1.85	3.5	2.15	1.42	2.0	2.0
6	3.6	2.2	2.3	13.0	2.6	2.0	2.05	2.6	2.0	1.48	3.2	2.0
7	3.05	2.2	2.3	7.7	2.6	2.0	2.0	2.25	1.95	1.45	3.8	2.0
8	2.85	2.3	2.35	9.1	2.55	2.0	2.15	2.3	1.9	1.6	3.8	2.0
9	2.75	2.45	2.3	16.8	2.55	1.95	2.9	2.35	1.8	2.15	7.2	2.0
10	2.6	2.8	2.3	11.0	2.5	1.92	3.4	2.15	1.7	2.35	5.8	2.0
11	2.6	3.2	2.25	6.4	2.5	1.9	2.7	1.9	1.6	7.4	3.3	2.0
12	2.5	3.35	2.2	5.6	2.45	1.85	2.25	1.8	1.8	4.2	2.7	2.0
13	2.4	3.35	2.2	5.0	2.4	1.85	2.2	1.7	1.85	2.8	2.6	1.9
14	2.4	3.05	2.2	4.4	2.4	1.82	2.5	1.9	1.8	2.0	2.5	1.9
15	2.3	2.85	2.15	4.0	2.35	1.8	3.4	2.0	1.7	1.9	2.4	2.0
16	2.3	2.75	2.1	3.8	2.3	1.8	5.5	1.9	1.6	1.9	2.35	1.95
17	2.3	2.55	2.1	3.55	2.3	2.1	6.0	1.8	1.6	5.6	2.3	2.3
18	2.25	2.45	2.05	3.4	2.25	2.4	4.5	1.8	1.6	5.5	2.8	2.2
19	2.3	2.4	2.1	3.3	2.25	2.4	2.8	1.85	1.55	3.6	3.1	2.05
20	2.25	2.4	3.25	3.6	2.25	2.5	2.45	2.1	1.5	2.35	2.7	2.1
21	2.2	4.2	3.1	3.6	2.45	2.3	2.35	2.15	1.6	2.15	2.6	2.3
22	2.2	4.2	2.7	3.2	2.9	2.05	2.15	2.1	1.85	2.1	2.5	2.6
23	2.2	3.8	2.5	3.1	2.95	2.0	2.1	2.0	1.85	2.05	2.4	7.0
24	2.15	2.85	2.4	3.0	2.8	1.95	2.15	1.85	1.55	2.0	2.3	5.2
25	2.15	2.5	2.4	2.9	2.65	1.92	2.2	1.7	1.5	2.0	2.2	4.3
26	2.2	2.45	2.4	2.8	2.45	1.9	2.2	1.6	1.4	1.95	2.15	3.8
27	2.2	2.4	3.85	2.8	2.3	1.9	2.2	1.6	1.4	1.9	2.1	4.6
28	2.2	2.4	3.65	2.85	2.25	2.3	2.05	1.6	1.4	1.85	2.05	4.0
29	2.15	.....	3.0	3.0	2.25	2.1	1.9	1.75	1.48	1.8	2.0	3.6
30	2.15	.....	2.7	3.0	2.3	2.05	1.8	1.7	1.45	1.8	2.05	3.2
31	2.1	.....	2.6	.....	2.4	.....	2.45	1.7	.....	1.75	.....	3.6

Daily discharge, in second-feet, of Etowah River near Rome, Ga., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,300	1,200	1,660	1,660	2,200	1,540	1,090	2,640	848	561	848	1,300
2	1,660	1,200	1,730	1,600	2,130	1,420	1,090	3,820	848	545	895	1,200
3	14,300	1,200	1,660	1,540	2,060	1,300	990	2,800	1,200	545	895	1,140
4	17,500	1,300	1,540	2,800	1,920	1,200	990	5,800	1,660	545	848	1,090
5	9,400	1,360	1,480	9,400	1,920	1,140	942	3,130	1,250	561	1,090	1,090
6	3,300	1,300	1,420	20,200	1,790	1,090	1,140	1,790	1,090	609	2,640	1,090
7	2,420	1,300	1,420	10,700	1,790	1,090	1,090	1,360	1,040	585	3,640	1,090
8	2,120	1,420	1,480	13,200	1,730	1,090	1,250	1,420	990	710	3,640	1,090
9	1,990	1,600	1,420	27,000	1,730	1,040	2,200	1,480	895	1,250	9,760	1,090
10	1,790	2,060	1,420	16,600	1,660	1,010	2,960	1,250	800	1,480	7,240	1,090
11	1,790	2,640	1,360	8,320	1,660	990	1,920	990	710	10,100	2,800	1,090
12	1,660	2,880	1,300	6,880	1,600	942	1,360	895	895	4,360	1,920	1,090
13	1,540	2,880	1,300	5,800	1,540	942	1,300	800	942	2,060	1,790	990
14	1,540	2,420	1,300	4,720	1,540	914	1,660	990	895	1,090	1,660	990
15	1,420	2,120	1,250	4,000	1,480	895	2,960	1,090	800	990	1,540	1,090
16	1,420	1,990	1,200	3,640	1,420	895	6,700	990	710	990	1,480	1,040
17	1,420	1,730	1,200	3,220	1,420	1,200	7,600	895	710	6,880	1,420	1,420
18	1,360	1,600	1,140	2,960	1,360	1,540	4,900	895	710	6,700	2,060	1,300
19	1,420	1,540	1,200	2,800	1,360	1,540	2,060	942	668	3,300	2,490	1,140
20	1,360	1,540	2,720	3,300	1,360	1,660	1,600	1,200	625	1,480	1,920	1,200
21	1,300	4,360	2,490	3,300	1,600	1,420	1,480	1,250	710	1,250	1,790	1,420
22	1,300	4,360	1,920	2,640	2,200	1,140	1,250	1,200	942	1,200	1,660	1,790
23	1,300	3,640	1,660	2,490	2,270	1,090	1,200	1,090	942	1,140	1,540	9,400
24	1,250	2,120	1,540	2,340	2,060	1,040	1,250	942	668	1,090	1,420	6,160
25	1,250	1,660	1,540	2,200	1,860	1,010	1,300	800	625	1,090	1,300	4,540
26	1,300	1,600	1,540	2,060	1,600	990	1,300	710	545	1,040	1,250	3,640
27	1,300	1,540	3,730	2,060	1,420	990	1,300	710	545	990	1,200	5,080
28	1,300	1,540	3,380	2,130	1,360	1,420	1,140	710	545	942	1,140	4,000
29	1,250	.....	2,340	2,340	1,360	1,200	990	848	609	895	1,090	3,300
30	1,250	.....	1,920	2,340	1,420	1,140	895	800	585	895	1,140	2,640
31	1,200	.....	1,790	.....	1,540	.....	1,600	800	.....	848	.....	3,300

NOTE.—Daily discharge computed from a rating curve fairly well defined below 4,000 second-feet. Above 10,000 second-feet the estimates are only approximate.

Monthly discharge of Etowah River near Rome, Ga., for 1911.

[Drainage area, 1,800 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	17,500	1,200	2,730	1.52	1.75	A.
February	4,360	1,200	2,000	1.11	1.16	A.
March	3,730	1,140	1,710	.950	1.10	A.
April	27,000	1,540	5,810	3.23	3.60	A.
May	2,270	1,360	1,690	.939	1.08	A.
June	1,660	895	1,160	.644	.72	A.
July	7,600	895	1,920	1.07	1.23	A.
August	5,800	710	1,450	.806	.93	A.
September	1,660	545	833	.463	.52	A.
October	10,100	545	1,830	1.02	1.18	A.
November	9,760	848	2,140	1.19	1.33	A.
December	9,400	990	2,190	1.22	1.41	A.
The year	27,000	545	2,120	1.18	16.01	

AMICALOLA RIVER NEAR POTTS MOUNTAIN, GA.

Location.—At a covered wagon bridge, known as Steeles Bridge, 2 miles east of Potts Mountain post office, and one-fourth mile above the mouth of Holley Creek; 15 miles from Ball Ground, Ga., which is the nearest railroad station.

Records available.—June 21, 1907, to December 31, 1908; June 7, 1910, to December 31, 1911.

Drainage area.—80 square miles.

Gage.—Vertical staff attached to a tree on the left bank 30 feet below the bridge; datum unchanged.

Channel.—Rocky and permanent at station, but may shift at a bar of small bowlders a short distance below.

Discharge measurements.—Made from the wagon bridge or by wading at low stages.

Accuracy.—Published data considered good.

Cooperation.—Gage observer is paid by the North Georgia Electric Co.

Discharge measurements of Amicalola River near Potts Mountain, Ga., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 30	M. R. Hall	1.62	179
Oct. 6	R. E. Robertson	1.15	56
6	.....do	1.15	58
6	.....do	1.15	59

Daily gage height, in feet, of Amicalola River near Potts Mountain, Ga., for 1911.

[J. A. Whitmore, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.5	1.4	1.5	1.6	1.9	1.6	1.35	1.3	1.3	1.2	1.3	1.45
2	3.1	1.4	1.5	1.55	1.9	1.6	1.35	1.6	1.3	1.2	1.28	1.45
3	3.7	1.4	1.5	1.55	1.9	1.6	1.3	1.7	1.3	1.2	1.28	1.45
4	2.4	1.4	1.5	1.6	1.8	1.6	1.3	1.7	1.3	1.2	1.3	1.45
5	1.9	1.4	1.5	9.5	1.8	1.6	1.7	2.0	1.5	1.2	1.3	1.45
6	1.8	1.5	1.45	3.0	1.75	1.55	1.45	1.5	1.4	1.2	2.15	1.45
7	1.7	1.5	1.45	2.8	1.75	1.55	1.3	2.1	1.3	1.2	1.7	1.4
8	1.6	1.5	1.45	3.3	1.7	1.55	2.65	2.0	1.3	1.6	1.5	1.4
9	1.55	1.55	1.4	3.0	1.7	1.5	1.9	1.5	1.3	1.6	3.0	1.4
10	1.5	1.5	1.4	2.5	1.7	1.5	1.6	1.4	1.3	4.0	1.8	1.4
11	1.5	1.5	1.4	2.6	1.7	1.5	1.5	1.35	1.3	1.8	1.7	1.4
12	1.5	1.5	1.4	2.55	1.7	1.45	1.5	1.3	1.3	1.5	1.7	1.4
13	1.5	1.5	1.4	2.5	1.65	1.45	1.45	1.3	1.3	1.4	1.6	1.4
14	1.5	1.5	1.4	2.4	1.65	1.4	2.0	1.3	1.25	1.35	1.5	1.38
15	1.5	1.5	1.4	2.3	1.6	1.4	1.4	1.3	1.25	1.35	1.5	1.38
16	1.5	1.5	1.4	2.25	1.6	1.4	1.4	1.25	1.25	1.35	1.45	1.45
17	1.5	1.5	1.4	2.2	1.6	1.4	1.4	1.25	1.25	2.6	1.45	1.4
18	1.5	1.5	1.4	2.1	1.6	1.4	1.4	1.7	1.25	1.9	2.0	1.4
19	1.5	2.0	1.45	2.05	1.6	1.9	1.4	1.5	1.25	1.6	1.6	1.4
20	1.5	1.75	1.6	2.0	1.6	1.6	1.4	1.4	1.35	1.5	1.5	1.45
21	1.5	1.6	1.5	1.95	1.9	1.5	1.4	1.3	1.3	1.45	1.5	1.45
22	1.45	1.5	1.45	1.95	1.75	1.8	1.4	1.3	1.3	1.45	1.45	3.4
23	1.4	1.5	1.45	1.95	1.9	1.45	1.4	1.3	1.25	1.4	1.45	2.5
24	1.4	1.5	1.4	1.9	1.8	1.4	1.4	1.25	1.25	1.4	1.45	1.95
25	1.4	1.5	1.4	1.85	1.65	1.4	1.5	1.25	1.25	1.4	1.45	1.9
26	1.4	1.5	2.0	1.85	1.6	1.4	1.4	1.25	1.25	1.35	1.45	2.0
27	1.4	1.5	1.8	1.8	1.6	1.4	1.4	1.7	1.25	1.35	1.45	1.9
28	1.4	1.5	1.75	1.8	1.8	1.35	1.4	1.5	1.25	1.35	1.45	3.0
29	1.4	.....	1.75	2.0	2.0	1.35	1.4	1.35	1.25	1.3	1.45	2.0
30	1.4	.....	1.7	1.95	1.8	1.35	1.35	1.3	1.25	1.3	1.45	1.9
31	1.4	.....	1.65	.....	1.6	.....	1.3	1.3	.....	1.3	.....	1.9

Daily discharge, in second-feet, of Amicalola River near Potts Mountain, Ga., for 1910–11.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1910.												
1	.....	.....	.....	.....	.....	.....	226	152	165	113	90	80
2	.....	.....	.....	.....	.....	.....	296	152	138	102	90	80
3	.....	.....	.....	.....	.....	.....	334	138	165	102	90	80
4	.....	.....	.....	.....	.....	.....	296	243	210	102	90	80
5	.....	.....	.....	.....	.....	.....	710	194	180	113	90	760
6	.....	.....	.....	.....	.....	.....	375	735	152	113	80	375
7	.....	.....	.....	.....	.....	296	420	226	138	113	80	334
8	.....	.....	.....	.....	.....	278	334	334	126	138	80	296
9	.....	.....	.....	.....	.....	260	296	260	165	138	80	260
10	.....	.....	.....	.....	.....	260	260	194	126	113	80	210
11	.....	.....	.....	.....	.....	260	243	165	126	113	80	165
12	.....	.....	.....	.....	.....	260	243	152	126	102	80	138
13	.....	.....	.....	.....	.....	260	226	152	126	102	80	102
14	.....	.....	.....	.....	.....	260	210	152	126	102	80	102
15	.....	.....	.....	.....	.....	260	194	226	126	102	80	90
16	.....	.....	.....	.....	.....	243	194	165	113	102	80	90
17	.....	.....	.....	.....	.....	243	194	152	113	102	80	90
18	.....	.....	.....	.....	.....	226	194	152	113	102	80	90
19	.....	.....	.....	.....	.....	210	194	138	113	102	80	90
20	.....	.....	.....	.....	.....	194	194	138	113	90	80	90
21	.....	.....	.....	.....	.....	194	180	138	102	90	80	90
22	.....	.....	.....	.....	.....	194	180	138	102	90	80	90
23	.....	.....	.....	.....	.....	194	165	126	102	90	80	138
24	.....	.....	.....	.....	.....	194	165	126	90	90	80	138
25	.....	.....	.....	.....	.....	194	165	126	90	90	80	113
26	.....	.....	.....	.....	.....	194	165	138	90	90	80	113
27	.....	.....	.....	.....	.....	180	165	138	90	90	80	113
28	.....	.....	.....	.....	.....	180	165	126	90	90	80	113
29	.....	.....	.....	.....	.....	226	152	126	90	90	80	113
30	.....	.....	.....	.....	.....	226	152	138	260	90	80	113
31	.....	.....	.....	.....	.....	.....	152	165	.....	90	.....	113

Daily discharge, in second-feet, of Amicalola River near Potts Mountain, Ga., for 1910–11— Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1911.												
1	138	113	138	165	260	165	102	90	90	69	90	126
2	810	113	138	152	260	165	102	165	90	69	86	126
3	1,140	113	138	152	260	165	90	194	90	69	86	126
4	465	113	138	165	226	165	90	194	90	69	90	126
5	260	113	138	4,550	226	165	194	296	138	69	90	126
6	226	138	126	760	210	152	126	138	113	69	354	126
7	194	138	126	660	210	152	90	334	90	69	194	113
8	165	138	126	915	194	152	585	296	90	165	138	113
9	152	152	113	760	194	138	260	138	90	165	760	113
10	138	138	113	510	194	138	165	113	90	1,300	226	113
11	138	138	113	560	194	138	138	102	90	226	194	113
12	138	138	113	535	194	126	138	90	90	138	194	113
13	138	138	113	510	180	126	126	90	90	113	165	113
14	138	138	113	465	180	113	296	90	80	102	138	108
15	138	138	113	420	165	113	113	90	80	102	138	108
16	138	138	113	398	165	113	113	80	80	102	126	126
17	138	138	113	375	165	113	113	80	80	560	126	113
18	138	138	113	334	165	113	113	194	80	260	296	113
19	138	296	126	315	165	260	113	138	80	165	165	113
20	138	210	165	296	165	165	113	113	102	138	138	126
21	138	165	138	278	260	138	113	90	90	126	138	126
22	126	138	126	278	210	226	113	90	90	126	126	970
23	113	138	126	278	260	126	113	90	80	113	126	510
24	113	138	113	260	226	113	113	80	80	113	126	278
25	113	138	113	243	180	113	138	80	80	113	126	260
26	113	138	296	243	165	113	113	80	80	102	126	296
27	113	138	226	226	165	113	113	194	80	102	126	260
28	113	138	210	226	226	102	113	138	80	102	126	760
29	113	.....	210	296	296	102	113	102	80	90	126	296
30	113	.....	194	278	226	102	102	90	80	90	126	260
31	113	.....	180	.....	165	.....	90	90	.....	90	.....	260

NOTE.—Daily discharge computed from a rating curve fairly well defined below 300 second-feet.

Monthly discharge of Amicalola River near Potts Mountain, Ga., for 1910–11.

[Drainage area, 80 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1910.						
June 7–30	296	180	229	2.86	2.55	A.
July	710	152	240	3.00	3.46	A.
August	735	126	184	2.30	2.65	A.
September	260	90	129	1.61	1.80	A.
October	138	90	102	1.28	1.48	A.
November	90	80	81.7	1.02	1.14	A.
December	760	80	156	1.95	2.25	A.
1911.						
January	1,140	113	205	2.56	2.95	A.
February	296	113	143	1.79	1.86	A.
March	296	113	143	1.79	2.06	A.
April	4,550	152	520	6.50	7.25	B.
May	296	165	205	2.56	2.95	A.
June	260	102	140	1.75	1.95	A.
July	585	90	142	1.78	2.05	A.
August	334	80	134	1.68	1.94	A.
September	138	80	88.1	1.10	1.23	A.
October	1,300	69	167	2.09	2.41	B.
November	760	86	169	2.11	2.35	A.
December	970	108	214	2.68	3.09	A.
The year	4,550	69	189	2.36	32.09	

TALLAPOOSA RIVER AT STURDEVANT, ALA.

Location.—At the Central of Georgia Railway bridge one-fourth mile west of Sturdevant, Ala., and 5 miles below the mouth of Hillabee Creek.

Records available.—July 19, 1900, to December 31, 1911.

Drainage area.—2,460 square miles.

Gage.—A vertical staff gage on the right bank of the river about 2,000 feet above the bridge. The original gage was a staff in two sections attached to the pier of the railroad bridge. A standard chain gage, installed July 10, 1905, was read until the summer of 1906, when the present gage was installed. The readings of the new staff gage are all corrected to agree with the readings of the standard chain gage referred to its original datum at the railroad bridge.

Channel.—Rocky and permanent; one side deep and sluggish at low stage. Both banks overflow for about 200 feet at extreme high stages.

Discharge measurements.—Made from a plank walk resting on the lower members of the deck railroad bridge. Some low-water measurements made from boat.

Artificial control.—The flow is under no artificial control except at a number of small mills a great distance upstream.

Accuracy.—A good rating has been developed and excellent results secured at this station.

Cooperation.—The gage observer is paid by the Alabama Geological Survey.

The following discharge measurement was made by M. R. Hall:
February 20, 1911: Gage height, 4.22 feet; discharge, 5,090 second-feet.

Daily gage height, in feet, of Tallapoosa River at Sturdevant, Ala., for 1911.

[C. J. Stowe, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.8	2.15	2.6	2.6	2.85	1.9	1.3	1.5	1.05	0.38	1.8	2.15
2	5.0	2.05	2.6	2.45	3.05	1.75	1.15	5.8	1.1	.29	1.4	1.9
3	12.3	2.05	2.7	2.4	2.95	1.6	1.1	5.4	1.0	.27	1.35	1.8
4	11.0	2.15	2.6	2.65	2.8	1.5	1.15	5.1	1.0	.22	1.3	1.7
5	7.6	2.35	2.5	7.9	2.55	1.55	1.65	4.5	1.8	.18	1.2	1.6
6	5.6	2.25	2.4	8.3	2.4	2.1	3.6	3.0	1.9	.18	1.4	1.6
7	4.3	3.2	2.4	6.3	2.4	2.1	2.2	2.4	2.2	.14	2.4	1.55
8	3.6	3.55	2.35	5.2	2.35	1.8	1.6	2.05	1.9	.09	3.3	1.5
9	3.3	4.0	2.35	6.7	2.25	1.55	1.35	1.8	1.25	.09	6.5	1.5
10	3.15	5.2	2.35	7.5	2.15	1.6	1.5	1.7	1.15	.11	5.6	1.5
11	2.9	4.9	2.4	6.7	2.15	1.55	1.85	1.6	1.0	.29	4.1	1.5
12	2.8	5.8	2.35	5.0	2.05	1.4	2.15	1.8	.9	.71	3.2	1.5
13	2.7	5.6	2.3	4.5	2.05	1.4	2.4	1.65	.81	1.3	2.7	1.5
14	2.6	4.5	2.25	4.1	1.95	1.3	2.9	2.45	.70	1.0	2.35	1.5
15	2.5	3.95	2.15	3.85	1.9	1.2	3.2	2.45	.62	.88	2.1	1.6
16	2.4	3.6	2.15	3.5	1.9	1.0	5.3	1.9	.56	.84	1.9	2.05
17	2.4	3.45	2.05	3.3	1.8	1.0	6.9	3.45	.54	2.3	1.85	2.15
18	2.35	3.2	2.05	3.2	1.9	1.25	6.5	4.3	.54	2.45	1.85	1.95
19	2.35	3.0	2.25	3.25	1.8	1.55	6.4	3.45	.56	3.3	2.2	1.9
20	2.35	3.95	3.0	3.15	1.9	1.65	4.5	2.8	.75	2.45	2.45	2.8
21	2.25	4.2	3.15	3.6	3.3	2.15	3.7	2.15	1.25	1.75	2.3	4.7
22	2.25	3.9	2.85	3.25	3.5	2.75	3.35	1.8	1.1	1.45	1.95	6.0
23	2.25	3.4	2.6	3.0	5.0	2.75	3.6	1.6	1.5	1.1	1.8	6.8
24	2.2	3.1	2.4	2.8	5.1	2.2	3.05	1.5	1.35	1.0	1.7	5.9
25	2.15	2.9	2.25	2.7	3.4	1.85	3.65	1.4	1.05	.95	1.75	4.7
26	2.05	2.8	3.1	2.65	2.75	1.65	3.5	1.25	.9	.84	1.9	4.1
27	2.15	2.7	4.3	2.65	2.35	2.4	2.65	1.2	.85	.88	1.8	5.2
28	2.15	2.6	4.1	3.35	2.15	2.15	2.25	1.15	.66	.95	2.35	5.0
29	2.15	.....	3.45	3.15	2.0	2.05	1.95	1.35	.58	1.25	2.55	4.1
30	2.25	.....	3.05	2.7	1.85	1.6	1.7	1.1	.58	1.1	2.3	4.1
31	2.25	.....	2.75	.....	1.8	.....	1.55	1.05	.....	1.45	.....	5.3

Daily discharge, in second-feet, of Tallapoosa River at Sturdevant, Ala., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,530	1,720	2,270	2,270	2,600	1,460	950	1,100	782	426	1,360	1,720
2	6,760	1,620	2,270	2,080	2,880	1,320	848	8,880	815	386	1,020	1,460
3	29,300	1,620	2,400	2,020	2,740	1,180	815	7,800	750	378	985	1,360
4	25,200	1,720	2,270	2,340	2,530	1,100	848	7,020	750	358	950	1,270
5	14,300	1,960	2,140	15,200	2,200	1,140	1,220	5,550	1,360	343	880	1,180
6	8,330	1,840	2,020	16,500	2,020	1,670	3,770	2,810	1,460	343	1,020	1,180
7	5,120	3,110	2,020	10,300	2,020	1,670	1,780	2,020	1,780	329	2,020	1,140
8	3,770	3,680	1,960	7,280	1,960	1,360	1,180	1,620	1,460	312	3,270	1,100
9	3,270	4,510	1,960	11,400	1,840	1,140	985	1,360	915	312	10,800	1,100
10	3,040	7,280	1,960	14,000	1,720	1,180	1,100	1,270	848	318	8,330	1,100
11	2,670	6,500	2,020	11,400	1,720	1,140	1,410	1,180	750	386	4,710	1,100
12	2,530	8,880	1,960	6,760	1,620	1,020	1,720	1,360	690	586	3,110	1,100
13	2,400	8,330	1,900	5,550	1,620	1,020	2,020	1,220	640	950	2,400	1,100
14	2,270	5,550	1,840	4,710	1,510	950	2,670	2,080	580	750	1,960	1,100
15	2,140	4,420	1,720	4,220	1,460	880	3,110	2,080	540	679	1,670	1,180
16	2,020	3,770	1,720	3,600	1,460	750	7,540	1,460	510	657	1,460	1,620
17	2,020	3,520	1,620	3,270	1,360	750	12,000	3,520	500	1,900	1,410	1,720
18	1,960	3,110	1,620	3,110	1,460	915	10,800	5,120	500	2,080	1,410	1,510
19	1,960	2,810	1,840	3,190	1,360	1,140	10,600	3,520	510	3,270	1,780	1,460
20	1,960	4,420	2,810	3,040	1,460	1,220	5,550	2,530	608	2,080	2,080	2,580
21	1,840	4,910	3,040	3,770	3,270	1,720	3,950	1,720	915	1,320	1,900	6,010
22	1,840	4,320	2,600	3,190	3,600	2,460	3,350	1,360	815	1,060	1,510	9,440
23	1,840	3,430	2,270	2,810	6,760	2,460	3,770	1,180	1,100	815	1,360	11,700
24	1,780	2,960	2,020	2,530	7,020	1,780	2,880	1,100	985	750	1,270	9,160
25	1,720	2,670	1,840	2,400	3,430	1,410	3,860	1,020	782	720	1,320	6,010
26	1,620	2,530	2,960	2,340	2,460	1,220	3,600	915	690	657	1,460	4,710
27	1,720	2,400	5,120	2,340	1,960	2,020	2,340	880	662	679	1,360	7,280
28	1,720	2,270	4,710	3,350	1,720	1,720	1,840	848	560	720	1,960	6,760
29	1,720	.....	3,520	3,040	1,560	1,620	1,510	985	520	915	2,200	4,710
30	1,840	.....	2,880	2,400	1,410	1,180	1,270	815	520	815	1,900	4,710
31	1,840	.....	2,460	.....	1,360	.....	1,140	782	.....	1,060	.....	7,540

NOTE.—Daily discharge computed from a well-defined rating curve.

Monthly discharge of Tallapoosa River at Sturdevant, Ala., for 1911.

[Drainage area, 2,460 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	29,300	1,620	4,610	1.87	2.16	A.
February	8,880	1,620	3,780	1.54	1.60	A.
March	5,120	1,620	2,380	.967	1.11	A.
April	16,500	2,020	5,350	2.17	2.42	A.
May	7,020	1,360	2,330	.948	1.09	A.
June	2,460	750	1,350	.549	.61	A.
July	12,000	815	3,240	1.32	1.52	A.
August	8,880	782	2,420	.984	1.13	A.
September	1,780	500	810	.329	.37	A.
October	3,270	312	850	.345	.40	A.
November	10,800	880	2,300	.935	1.04	A.
December	11,700	1,100	3,390	1.38	1.59	A.
The year	29,300	312	2,730	1.11	15.04	

TOMBIGBEE RIVER AT COLUMBUS, MISS.

Location.—At the county highway bridge at Columbus, Miss., 2 miles above the mouth of Luxapalilla Creek and about 6 miles below the mouth of Tibbee River.

Records available.—July 13, 1905, to December 31, 1911. Also for 1900 to 1904, using the gage heights furnished by the United States Weather Bureau, some of which, especially for low stages, were very greatly in error.

Drainage area.—4,440 square miles.

Gage.—Chain gage was installed by the United States Geological Survey on July 13, 1905, at the highway bridge 1,000 feet above the original site of the gage of the United States Weather Bureau. The new gage was set to read the same as the first United States Weather Bureau gage at low water, which makes it practically on the same datum, as the low-water surface is almost level.

Channel.—The right bank is high and seldom overflows. The left bank overflows only under the bridge approach at a gage height of about 20 feet. The bed of the stream is of soft limestone or chalk and conditions of flow are somewhat changeable at low stages.

Discharge measurements.—Made from the wagon bridge.

Accuracy.—Estimates may be somewhat in error at low stages due to changes at controlling section.

Discharge measurements of Tombigbee River at Columbus, Miss., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Aug. 25	R. E. Robertson	1.06	3,650
Nov. 11	do	−2.42	980
11	do	−2.41	951

Daily gage height, in feet, of Tombigbee River at Columbus, Miss., for 1911.

[C. R. Shackelford, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.45	−0.05	8.2	2.05	10.3	−2.25	−0.8	−2.0	−1.5	−3.9	−3.6	−1.4
2	9.8	− .05	9.6	1.15	10.2	−2.45	−1.0	.2	−2.0	−3.9	−3.7	−1.4
3	13.1	− .45	10.8	.35	8.4	−2.55	−1.7	.1	−2.4	−3.9	−3.7	−1.7
4	13.8	− .65	11.2	− .25	6.7	−2.65	−2.4	.1	−2.7	−4.0	−3.7	−2.0
5	15.6	− .75	9.9	11.8	4.5	−2.75	−2.8	.3	−2.9	−4.0	−3.7	−2.2
6	17.8	− .65	6.9	14.6	2.85	−2.75	−2.9	.0	−3.0	−4.0	−3.7	−2.4
7	17.6	− .35	3.75	16.4	1.95	−2.75	−2.5	− .1	−3.0	−4.0	−3.7	−2.5
8	16.1	.85	2.45	19.5	1.25	−2.85	−2.5	− .8	−3.0	−4.0	−3.7	−2.6
9	12.0	2.55	1.75	21.2	.75	−2.85	−2.8	− .6	−3.1	−4.1	−3.3	−2.7
10	6.6	6.6	1.25	21.7	.35	−2.85	−2.8	.1	−2.7	−4.1	−2.9	−2.8
11	3.65	7.6	.75	21.1	− .15	−2.95	−3.0	− .1	−2.5	−4.1	−2.5	−2.5
12	2.05	9.6	.25	21.1	− .45	−3.15	−3.0	− .9	−2.4	−4.1	−2.3	− .9
13	1.15	10.7	.05	21.4	− .65	−3.25	− .8	−1.7	−2.4	−4.0	−2.4	4.6
14	.55	11.0	− .15	21.0	− .85	−3.25	.6	−2.2	−2.3	−3.5	−2.5	8.6
15	.15	10.8	− .25	19.5	−1.05	−3.35	2.5	−2.5	−2.4	−3.1	−2.4	12.8
16	− .15	9.6	− .25	17.4	−1.25	−3.35	1.4	.8	−2.5	−3.2	−2.2	13.8
17	− .45	8.2	− .45	14.8	−1.65	−3.45	.0	.3	−2.8	−3.4	−2.2	14.4
18	− .55	6.9	− .65	13.2	−1.65	−3.55	.2	− .5	−3.0	−3.5	−2.3	15.4
19	− .65	5.3	− .85	13.7	−1.75	−3.55	− .6	.2	−3.3	−3.1	−2.4	16.0
20	− .85	4.3	− .95	16.3	−1.85	−3.25	− .9	1.4	−3.4	−2.1	−2.3	16.0
21	−1.05	4.2	− .45	18.1	−1.75	−3.35	−1.2	2.0	−3.5	−2.4	−2.1	15.2
22	−1.25	4.1	.25	22.5	− .95	−3.35	−2.0	1.8	−3.6	−2.8	−2.0	14.1
23	−1.25	3.45	.25	26.0	.65	−2.85	2.6	1.8	−3.7	−3.0	−2.3	14.4
24	−1.25	2.25	− .15	26.2	.65	−2.05	5.0	1.7	−3.7	−3.3	−2.6	14.1
25	−1.35	1.45	− .55	24.7	.75	−1.55	5.0	1.3	−3.7	−3.4	−2.7	13.5
26	−1.45	.95	− .65	22.2	.75	− .95	4.2	.5	−3.8	−3.5	−2.6	14.3
27	−1.45	.95	.05	18.9	− .35	− .25	3.6	− .5	−3.8	−3.6	−2.4	17.0
28	− .75	7.0	3.15	16.1	− .95	− .55	2.3	− .6	−3.8	−3.6	−2.2	18.1
29	.35	.....	4.6	13.6	−1.45	.35	.6	− .3	−3.8	−3.6	−2.0	17.9
30	.25	.....	4.5	11.2	−1.75	− .15	− .6	− .3	−3.9	−3.6	−1.6	17.6
31	.05	.....	3.3	.....	−2.05	.....	−1.6	− .9	.....	−3.6	.....	18.4

Daily discharge, in second-feet, of Tombigbee River at Columbus, Miss., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,980	2,540	11,600	4,470	14,400	980	1,940	1,130	1,460	250	345	1,520
2	13,700	2,540	13,400	3,620	14,300	868	1,800	2,760	1,130	250	310	1,520
3	18,600	2,210	15,100	2,900	11,800	812	1,320	2,670	895	250	310	1,320
4	19,700	2,050	15,700	2,370	9,640	760	895	2,670	735	220	310	1,130
5	22,700	1,980	13,900	16,600	7,030	710	685	2,850	635	220	310	1,010
6	26,500	2,050	9,880	21,000	5,270	710	635	2,580	590	220	310	895
7	26,200	2,290	6,200	24,000	4,370	710	840	2,500	590	220	310	840
8	23,500	3,340	4,870	30,000	3,710	660	840	1,940	590	220	310	785
9	16,900	4,970	4,180	34,000	3,260	660	685	2,090	545	195	460	735
10	9,520	9,520	3,710	35,200	2,900	660	685	2,670	735	195	635	685
11	6,100	10,800	3,260	33,800	2,450	612	590	2,500	840	195	840	840
12	4,470	13,400	2,800	33,800	2,210	522	590	1,870	895	195	950	1,870
13	3,620	15,000	2,620	34,500	2,050	480	1,940	1,320	895	220	895	7,140
14	3,080	15,400	2,450	33,500	1,900	480	3,120	1,010	950	380	840	12,100
15	2,720	15,100	2,370	30,000	1,760	440	4,920	840	895	545	895	18,100
16	2,450	13,400	2,370	25,800	1,620	440	3,850	3,300	840	500	1,010	19,700
17	2,210	11,600	2,210	21,300	1,360	400	2,580	2,850	685	420	1,010	20,700
18	2,130	9,880	2,050	18,800	1,360	362	2,760	2,170	590	380	950	22,300
19	2,050	7,960	1,900	19,600	1,290	362	2,090	2,760	460	545	895	23,400
20	1,900	6,810	1,840	23,900	1,130	480	1,870	3,850	420	1,070	950	23,400
21	1,760	6,700	2,210	27,100	1,290	440	1,660	4,420	380	895	1,070	22,000
22	1,620	6,590	2,800	37,200	1,840	440	1,130	4,230	345	685	1,130	20,200
23	1,620	5,880	2,800	46,000	3,160	660	5,020	4,230	310	590	950	20,700
24	1,620	4,670	2,450	46,500	3,160	1,100	7,600	4,140	310	460	785	20,200
25	1,560	3,900	2,130	42,800	3,260	1,420	7,600	3,760	310	420	735	19,300
26	1,490	3,440	2,050	36,500	3,260	1,840	6,700	3,030	280	380	785	20,500
27	1,490	3,440	2,620	28,700	2,290	2,370	6,040	2,170	280	345	895	25,100
28	1,980	10,000	5,570	23,500	1,840	2,130	4,720	2,090	280	345	1,010	27,100
29	2,900	.....	7,140	19,400	1,490	2,900	3,120	2,330	280	345	1,130	26,700
30	2,800	.....	7,030	15,700	1,290	2,450	2,090	2,330	250	345	1,390	26,200
31	2,620	.....	5,720	.....	1,100	.....	1,390	1,870	.....	345	.....	27,700

NOTE.—Daily discharge computed from a rating curve well defined below 4,000 second-feet and fairly well defined below 32,000 second-feet.

Monthly discharge of Tombigbee River at Columbus, Miss., for 1911.

[Drainage area, 4,440 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	26,500	1,490	7,500	1.69	1.95	B.
February	15,400	1,980	7,050	1.59	1.66	B.
March	15,700	1,840	5,320	1.20	1.38	B.
April	46,500	2,370	25,800	5.81	6.48	C.
May	14,400	1,100	3,800	.856	.99	B.
June	2,900	362	929	.209	.23	B.
July	7,600	590	2,640	.595	.69	A.
August	4,420	840	2,610	.588	.68	A.
September	1,460	250	613	.138	.15	B.
October	1,070	195	382	.086	.10	B.
November	1,390	310	758	.171	.19	B.
December	27,700	685	13,400	3.02	3.48	B.
The year	46,500	195	5,880	1.32	17.98	

TOMBIGBEE RIVER AT EPES, ALA.

Location.—At the Alabama Great Southern Railroad bridge just below the mouth of Jones Creek, about half a mile from Epes, Ala.

Records available.—1900 and 1901 (discharge measurements were made by the United States Geological Survey and a rating was developed for those years); November 29, 1904, to December 31, 1911. A record of approximate gage heights, based on a gage painted on one of the bridge piers, has been kept by the Alabama Great Southern Railroad for a number of years.

Drainage area.—8,830 square miles.

Gage.—Standard chain gage attached to the railroad bridge; datum unchanged.

Channel.—At flood stages—gage heights of 38 feet and over—the left bank overflows for about seven-eighths of a mile under the trestle approach to the bridge. Some changes in section have probably occurred since the station was established.

Discharge measurements.—Made from the downstream side of the railroad bridge.

Accuracy.—Good results have been obtained at this station in the years when sufficient discharge measurements were made to fix the rating curve.

Cooperation.—Gage observer paid by the Alabama Geological Survey.

Discharge measurements of Tombigbee River at Epes, Ala., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Aug. 17	R. E. Robertson	3.40	2,860
17	.....do	3.98	3,310

Daily gage height, in feet, of Tombigbee River at Epes, Ala., for 1911.

[George Haven, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.75	5.1	11.1	9.0	33.9	2.75	5.0	4.0	3.6	0.7	0.9	3.7
2	21.6	5.0	13.6	7.7	31.5	2.45	4.5	4.1	3.0	.6	.9	3.8
3	26.3	4.9	15.0	6.5	28.7	2.25	4.0	4.2	2.6	.6	.9	3.9
4	27.4	4.75	16.4	5.7	25.0	2.1	4.1	5.0	2.2	.6	.9	3.7
5	27.8	4.5	17.3	9.9	19.8	2.0	2.9	5.2	2.0	.6	.9	3.4
6	28.0	4.35	17.5	20.4	14.5	1.85	2.3	5.4	2.0	.5	1.0	3.0
7	28.4	6.2	16.0	23.8	10.7	1.8	2.0	5.2	1.6	.5	1.1	2.6
8	29.3	5.4	11.7	26.0	8.8	1.75	1.9	4.8	1.8	.5	1.8	2.4
9	29.9	10.8	9.2	27.9	7.6	1.65	2.0	4.2	1.8	.5	4.0	2.3
10	29.9	14.6	8.0	29.5	7.0	1.65	2.0	3.7	1.6	.5	2.7	2.2
11	28.5	15.8	7.6	31.4	6.4	1.65	1.9	4.0	1.6	.6	2.4	2.6
12	23.6	18.0	7.0	33.3	5.7	1.65	1.9	4.2	1.8	.6	2.8	8.8
13	16.5	19.6	6.5	34.0	5.0	1.45	2.0	3.9	1.9	.6	3.4	15.4
14	11.2	20.7	5.9	35.7	4.55	1.35	3.9	3.3	1.9	.6	3.0	22.6
15	8.6	21.2	5.3	36.4	4.2	1.35	10.4	2.7	1.9	.6	2.8	26.6
16	7.3	21.2	4.9	36.6	3.9	1.25	12.4	2.5	1.8	.7	2.6	30.0
17	6.6	20.6	4.75	36.6	3.6	1.15	13.2	3.5	1.8	1.4	2.6	30.8
18	5.8	19.0	4.5	36.1	3.4	1.15	8.4	4.6	1.7	1.5	2.6	30.8
19	5.1	16.8	4.3	34.9	3.2	1.15	6.4	6.0	1.6	1.4	2.8	30.2
20	4.7	14.7	4.15	33.1	3.05	1.15	5.3	6.2	1.4	1.3	2.7	30.4
21	4.4	12.8	4.0	31.1	2.9	1.2	4.6	6.6	1.2	1.6	2.5	31.5
22	4.2	12.0	4.15	30.0	3.0	1.25	4.1	7.1	1.0	2.0	2.6	33.6
23	4.0	11.4	4.7	29.8	3.7	1.25	4.1	6.6	1.0	2.0	2.8	36.1
24	3.9	10.7	4.7	30.5	5.0	1.6	10.0	6.5	.9	1.8	2.7	36.8
25	4.05	9.4	4.75	31.8	5.0	2.05	12.9	6.1	.9	1.6	2.4	37.0
26	4.05	8.0	4.5	33.0	5.2	3.3	12.8	5.7	.9	1.3	2.2	37.2
27	3.9	7.3	4.45	34.0	5.3	3.95	11.8	5.1	.8	1.2	2.1	37.4
28	3.75	7.2	4.85	35.4	4.9	4.95	10.9	4.2	.8	1.1	5.1	37.0
29	3.95	.....	7.5	35.8	4.35	4.8	9.2	3.6	.8	1.0	5.2	37.0
30	4.85	.....	9.3	35.2	3.5	5.0	7.0	3.7	.7	1.0	4.0	37.2
31	5.2	.....	9.9	.....	3.1	.....	5.2	3.9	.....	.9	.....	38.2

Daily discharge, in second-feet, of Tombigbee River at Epes, Ala., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,840	4,420	10,400	8,200	34,100	2,290	4,320	3,400	3,040	770	895	3,130
2	21,300	4,320	13,000	6,900	31,600	2,040	3,850	3,490	2,500	710	895	3,220
3	26,200	4,220	14,400	5,740	28,700	1,880	3,400	3,580	2,160	710	895	3,310
4	27,300	4,080	15,900	4,980	24,800	1,760	3,490	4,320	1,840	710	895	3,130
5	27,700	3,850	16,800	9,120	19,400	1,680	2,420	4,510	1,680	710	895	2,860
6	27,900	3,720	17,000	20,000	13,900	1,570	1,920	4,700	1,680	655	960	2,500
7	28,400	5,460	15,500	23,600	9,950	1,530	1,680	4,510	1,380	655	1,030	2,160
8	29,300	4,700	11,000	25,900	8,000	1,490	1,600	4,130	1,530	655	1,530	2,000
9	29,900	10,100	8,400	27,800	6,800	1,420	1,680	3,580	1,530	655	3,400	1,920
10	29,900	14,000	7,200	29,500	6,220	1,420	1,680	3,130	1,380	655	2,240	1,840
11	28,500	15,300	6,800	31,500	5,650	1,420	1,600	3,400	1,380	710	2,000	2,160
12	23,400	17,500	6,220	33,500	4,980	1,420	1,600	3,580	1,530	710	2,330	8,000
13	16,000	19,200	5,740	34,200	4,320	1,280	1,680	3,310	1,600	710	2,860	14,800
14	10,500	20,300	5,180	35,900	3,900	1,200	3,310	2,270	1,600	710	2,500	22,300
15	7,800	20,900	4,600	36,700	3,580	1,200	9,640	2,240	1,600	710	2,330	26,500
16	6,500	20,900	4,220	36,900	3,310	1,140	11,700	2,080	1,530	770	2,160	30,000
17	5,840	20,200	4,080	36,900	3,040	1,060	12,500	2,950	1,530	1,240	2,160	30,900
18	5,080	18,600	3,850	36,400	2,860	1,060	7,600	3,940	1,460	1,310	2,160	30,900
19	4,420	16,300	3,670	35,100	2,680	1,060	5,650	5,270	1,380	1,240	2,330	30,200
20	4,040	14,100	3,540	33,200	2,540	1,060	4,600	5,460	1,240	1,170	2,240	30,400
21	3,760	12,100	3,400	31,200	2,420	1,100	3,940	5,840	1,100	1,380	2,080	31,600
22	3,580	11,300	3,540	30,000	2,500	1,140	3,490	6,320	960	1,680	2,160	33,800
23	3,400	10,700	4,040	29,800	3,130	1,200	3,490	5,840	960	1,680	2,230	36,400
24	3,310	9,950	4,040	30,500	4,320	1,380	9,220	5,740	895	1,530	2,240	37,100
25	3,440	8,600	4,080	31,900	4,320	1,720	12,200	5,360	895	1,380	2,000	37,300
26	3,440	7,200	3,850	33,100	4,510	2,770	12,100	4,980	895	1,170	1,840	37,500
27	3,310	6,500	3,800	34,200	4,600	3,360	11,100	4,420	830	1,100	1,760	37,700
28	3,180	6,410	4,180	35,600	4,220	4,270	10,200	3,580	830	1,030	4,420	37,300
29	3,360	.....	6,700	36,100	3,720	4,130	8,400	3,040	830	960	4,510	37,300
30	4,180	.....	8,500	35,400	2,950	4,320	6,220	3,130	770	960	3,400	37,500
31	4,510	.....	9,120	.....	2,590	.....	4,510	3,310	.....	895	.....	28,500

NOTE.—Daily discharge computed from a rating curve fairly well defined below 16,000 second-feet.

Monthly discharge of Tombigbee River at Epes, Ala., for 1911.

[Drainage area, 8,830 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	29,900	2,840	13,000	1.47	1.70	B.
February	20,900	3,720	11,200	1.27	1.32	B.
March	17,000	3,400	7,510	.851	.98	A.
April	36,900	4,980	28,000	3.17	3.54	B.
May	34,100	2,420	8,370	.948	1.09	B.
June	4,320	1,060	1,810	.205	.23	B.
July	12,500	1,600	5,510	.624	.72	B.
August	6,320	2,080	4,060	.460	.53	A.
September	3,040	770	1,420	.161	.18	B.
October	1,680	655	965	.109	.13	B.
November	4,510	895	2,110	.239	.27	B.
December	38,500	1,840	21,100	2.39	2.76	B.
The year	38,500	655	8,740	.990	13.45	

BLACK WARRIOR RIVER NEAR CORDOVA, ALA.

Location.—At the Kansas City, Memphis & Birmingham Railroad bridge, 1 mile east of Cordova and just below the mouth of Cane Creek, 12 miles below junction of Mulberry and Sipsey forks, and 6 miles below the mouth of Blackwater Creek.

Records available.—May 21, 1900, to December 31, 1911.

Drainage area.—1,900 square miles.

Gage.—Staff gage in three sections, the lower one being a sloping timber bolted to bedrock, graduated from −0.6 to 10.0 feet; the other two sections are vertical timbers. All the sections are on the right bank near the railroad bridge. The datum of the gage has not been changed, but several gages at slightly different sites have been used.

Channel.—The bed is rocky with a fair current except at low stages; at high stages the left bank overflows under the bridge.

Discharge measurements.—Made from the railroad bridge. Some of the low-water measurements have been made by wading or from a boat at other sections near by.

Accuracy.—The minimum flow is especially low per square mile of drainage area, and the rating at this stage is subject to considerable change.

Cooperation.—Gage heights furnished by the United States Engineer Corps.

Discharge measurements of Black Warrior River near Cordova, Ala., for 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Nov. 10	R. E. Robertson	−0.25	446
10	do	−0.25	444

Daily gage height, in feet, of Black Warrior River near Cordova, Ala., for 1911.

[C. R. Jones, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1911.												
1	0.4	1.3	7.9	1.5	2.6	−0.15	0.0	−0.2	−0.6	−0.95	−0.9	−0.2
2	16.0	1.1	7.0	1.2	3.4	− .2	− .2	.2	− .6	− .95	−1.0	− .2
3	30.0	.9	6.2	1.0	3.0	− .25	− .3	.9	− .6	− .95	−1.0	− .2
4	24.5	1.1	4.9	.8	2.6	− .3	− .4	1.8	− .65	−1.0	−1.0	− .2
5	10.0	1.4	4.0	22.0	2.0	− .3	− .5	.6	− .7	−1.0	−1.0	− .3
6	6.0	1.5	3.5	28.5	1.5	− .35	− .5	.3	− .7	−1.0	−1.0	− .3
7	4.0	3.5	3.0	16.8	1.2	− .4	.3	.1	− .7	−1.0	−1.0	− .3
8	3.0	4.2	2.2	12.6	.8	− .45	.0	.3	− .7	−1.0	−1.0	− .3
9	2.6	7.8	1.7	22.0	.7	− .5	− .2	.5	− .5	−1.0	− .9	− .3
10	2.0	14.8	1.4	20.0	.5	− .5	.0	.2	− .5	−1.0	− .5	− .4
11	2.0	11.6	1.4	12.0	.4	− .5	.6	.1	− .6	−1.0	− .5	− .3
12	1.8	8.7	1.3	8.7	.3	− .55	.4	.0	.1	−1.0	− .2	2.0
13	1.6	6.1	1.1	6.8	.3	− .6	.4	− .2	.0	−1.0	− .2	7.0
14	1.4	6.1	1.0	5.5	.3	− .65	1.9	.0	− .2	−1.0	− .3	9.2
15	1.4	5.8	1.0	5.0	.2	− .7	1.1	.2	− .3	−1.0	− .4	10.3
16	1.4	4.9	.9	5.3	.15	− .7	.8	.5	− .4	−1.0	− .5	13.3
17	1.3	4.1	.8	5.0	.15	− .7	.6	.7	− .5	− .5	− .6	11.4
18	1.3	3.6	.8	4.2	.0	− .7	.4	1.2	− .55	3.0	− .4	6.5
19	1.0	2.9	.7	3.7	.0	− .7	.2	1.6	− .6	1.1	− .4	6.4
20	1.0	3.8	.6	17.1	.1	− .5	.1	1.1	− .6	1.0	− .4	4.5
21	.8	3.8	.6	13.2	.5	− .5	.3	.7	− .6	.9	− .4	5.4
22	.7	3.0	.6	8.6	1.3	− .5	.6	.3	− .65	.7	− .5	7.4
23	.6	2.6	.6	5.1	3.1	− .5	1.1	.0	− .7	.5	− .5	14.0
24	.4	2.3	.5	4.0	3.0	.8	.9	− .2	− .75	.2	− .2	13.0
25	1.2	2.1	.5	3.2	2.4	.4	.6	− .25	− .8	.1	− .1	8.5
26	1.9	2.0	1.1	2.4	1.5	.9	.3	− .3	− .85	.1	− .2	9.4
27	1.8	2.5	2.5	2.1	.8	1.5	.0	− .35	− .9	.0	− .2	20.2
28	1.7	8.7	3.0	2.8	.5	1.1	− .1	− .4	− .9	.0	.7	20.5
29	1.6	.....	2.6	2.8	.2	.9	− .2	− .4	− .9	− .1	.8	12.5
30	1.6	.....	2.2	2.7	.0	.4	− .3	− .5	− .9	− .3	.8	7.6
31	1.5	.....	1.7	.....	− .1	.....	− .3	− .6	.....	− .6	.....	14.0

Daily discharge, in second-feet, of Black Warrior River near Cordova, Ala., for 1909–1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1909.												
1	1,460	1,220	7,710	2,940	10,100	2,160	4,520	2,380	318	195	155	240
2	1,260	1,120	6,600	2,660	12,000	5,560	3,520	1,750	318	195	155	375
3	1,080	1,080	7,710	2,380	8,130	6,470	2,720	2,270	290	195	155	318
4	915	995	7,430	2,160	6,470	30,400	2,270	2,540	290	195	155	265
5	4,780	995	6,340	1,960	4,650	29,600	1,850	2,160	265	175	140	240
6	12,100	1,850	5,560	1,850	3,400	17,000	1,460	2,270	265	175	140	685
7	9,950	2,940	6,470	2,940	2,380	10,200	1,170	2,490	240	175	140	1,460
8	5,820	2,940	8,830	7,150	2,830	7,010	1,360	2,490	218	155	140	2,380
9	4,580	1,850	24,400	8,830	2,160	4,390	1,850	1,750	218	155	140	2,380
10	3,400	17,400	27,600	4,520	1,850	10,500	2,380	1,260	195	140	140	1,550
11	2,830	19,900	22,600	3,400	1,650	8,130	1,850	1,080	195	140	140	1,750
12	2,490	13,600	21,200	2,830	1,500	6,470	1,460	915	195	140	140	540
13	2,220	10,400	41,600	3,520	1,410	5,690	1,260	760	195	140	140	290
14	2,060	24,100	60,400	12,400	1,260	5,430	1,080	685	195	140	140	540
15	6,340	30,400	59,600	9,670	1,170	6,080	995	610	175	610	140	915
16	9,110	31,200	50,000	5,950	1,170	5,820	915	575	175	470	155	760
17	13,900	23,800	40,200	4,780	2,160	4,520	915	575	175	405	470	610
18	10,900	18,600	28,900	3,880	2,380	3,640	1,170	540	155	345	345	540
19	8,130	13,800	18,400	3,290	2,270	2,830	1,080	470	155	290	290	540
20	5,560	10,600	10,400	2,830	2,940	2,160	995	438	155	240	240	470
21	4,520	9,110	17,600	2,490	1,750	2,600	915	405	195	470	240	405
22	3,760	7,570	19,400	2,380	2,270	29,600	875	375	610	345	218	345
23	3,400	19,200	11,800	3,290	1,960	27,400	835	345	540	240	470	290
24	3,120	25,600	9,950	19,900	1,260	18,600	835	345	835	240	405	265
25	2,720	29,600	8,130	11,500	1,550	10,200	760	318	540	240	345	405
26	2,220	23,000	6,730	14,600	3,060	7,710	685	318	345	218	318	540
27	1,960	15,000	5,820	14,500	2,940	7,010	610	290	290	218	290	540
28	1,750	10,900	5,170	13,200	2,270	6,470	540	290	265	195	290	540
29	1,600	.....	4,390	10,100	2,060	5,820	540	290	240	175	265	505
30	1,410	.....	3,760	7,570	1,850	5,300	1,080	290	218	155	265	505
31	1,310	.....	3,290	.....	1,360	.....	1,960	290	.....	155	.....	505
1910.												
1	430	985	12,800	575	430	1,080	4,520	1,460	300	190	190	145
2	430	895	12,400	538	398	895	7,290	1,170	500	190	190	145
3	430	852	13,200	538	650	730	6,470	895	895	145	190	145
4	398	852	8,270	500	985	650	6,210	895	500	145	145	190
5	398	810	5,960	538	730	575	7,710	985	430	145	145	810
6	895	810	4,910	730	538	1,170	8,690	1,170	365	110	190	4,130
7	14,800	810	3,880	650	430	1,850	13,900	4,520	365	1,460	190	7,150
8	10,900	770	3,180	612	650	1,260	12,800	6,470	240	895	190	3,180
9	5,820	770	2,600	575	1,080	770	9,250	3,060	145	895	145	1,460
10	4,460	770	2,160	538	770	1,960	7,990	2,490	110	810	145	1,080
11	3,520	730	4,000	538	612	9,950	6,470	1,650	110	810	145	895
12	2,720	810	3,640	500	500	5,170	4,910	1,170	110	730	145	810
13	2,060	1,170	2,600	500	430	4,520	3,700	1,080	80	730	145	730
14	1,650	895	2,270	500	365	3,760	4,260	1,080	80	1,850	145	730
15	1,360	810	1,850	465	332	3 060	4,650	985	53	2,830	110	650
16	1,170	730	1,650	500	500	2,380	2,490	730	53	2,720	110	575
17	1,080	895	1,460	1,650	1,170	1,850	3,290	500	53	1,360	110	500
18	985	18,200	1,360	2,380	810	1,460	3,880	365	40	1,080	110	430
19	1,550	15,400	1,260	1,850	500	1,080	5,040	300	40	500	110	365
20	1,170	8,550	1,170	1,360	430	810	4,390	240	28	365	110	365
21	2,940	6,080	1,080	1,080	895	3,180	3,640	300	28	240	110	300
22	6,080	6,870	985	895	9,110	4,130	3,290	240	28	190	110	300
23	4,390	5,950	940	810	11,100	4,260	2,060	240	28	190	110	300
24	3,290	5,300	895	730	7,570	2,380	1,080	240	110	145	110	500
25	2,600	5,170	852	650	8,270	1,650	1,260	240	240	145	110	1,260
26	2,060	4,780	810	1,460	10,200	1,960	1,750	190	190	145	110	1,170
27	1,850	4,130	770	538	5,690	1,550	1,360	190	145	110	110	985
28	1,650	8,130	730	500	3,520	1,960	1,080	190	110	300	190	895
29	1,460	.....	690	465	2,490	2,270	1,080	190	145	240	190	895
30	1,260	.....	650	465	1,850	3,060	810	190	190	240	190	895
31	1,120	.....	612	.....	1,360	.....	1,650	300	.....	240	.....	810

Daily discharge, in second-feet, of Black Warrior River near Cordova, Ala., for 1909–1911—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1911.												
1	880	1,650	10,100	1,850	3,060	508	605	475	250	115	130	475
2	22,200	1,460	8,830	1,560	4,000	475	475	740	250	115	100	475
3	43,200	1,280	7,710	1,360	3,520	445	415	1,280	250	115	100	475
4	35,900	1,460	5,950	1,190	3,060	415	355	2,160	228	100	100	475
5	13,200	1,750	4,780	31,200	2,380	415	300	1,030	205	100	100	415
6	7,430	1,850	4,130	40,900	1,850	385	300	810	205	100	100	415
7	4,780	4,130	3,520	23,400	1,560	355	810	670	205	100	100	415
8	3,520	5,040	2,600	17,000	1,190	328	605	810	205	100	100	415
9	3,060	9,950	2,060	31,200	1,110	300	475	955	300	100	130	415
10	2,380	20,400	1,750	28,200	955	300	605	740	300	100	300	355
11	2,380	15,600	1,750	16,200	880	300	1,030	670	250	100	300	415
12	2,160	11,200	1,650	11,200	810	275	880	605	670	100	475	2,380
13	1,960	7,570	1,460	8,550	810	250	880	475	605	100	475	8,830
14	1,750	7,570	1,360	6,730	810	228	2,270	605	475	100	415	12,000
15	1,750	7,150	1,360	6,080	740	205	1,460	740	415	100	355	13,600
16	1,750	5,950	1,280	6,470	705	205	1,190	955	355	100	300	18,100
17	1,650	4,910	1,190	6,080	705	205	1,030	1,110	300	300	250	15,200
18	1,650	4,260	1,190	5,040	605	205	880	1,560	275	3,520	355	8,130
19	1,360	3,400	1,110	4,390	605	205	740	1,960	250	1,460	355	7,990
20	1,360	4,520	1,030	23,800	670	300	670	1,460	250	1,360	355	5,430
21	1,190	4,520	1,030	18,000	955	300	810	1,110	250	1,280	355	6,600
22	1,110	3,520	1,030	10,200	1,650	300	1,030	810	228	1,110	300	9,390
23	1,030	3,060	1,030	6,210	3,640	300	1,460	665	205	955	300	19,200
24	880	2,720	955	4,780	3,520	1,190	1,280	475	185	740	475	17,600
25	1,560	2,490	955	3,760	2,830	880	1,030	445	165	670	540	10,900
26	2,270	2,380	1,460	2,830	1,850	1,280	810	415	148	670	475	12,200
27	2,160	2,940	2,940	2,490	1,190	1,850	605	385	130	605	475	28,400
28	2,060	11,200	3,520	3,290	955	1,460	540	355	130	605	1,110	28,900
29	1,960	.....	3,060	3,290	740	1,280	475	355	130	540	1,190	16,900
30	1,960	.....	2,600	3,180	605	880	415	300	130	415	1,190	9,670
31	1,850	.....	2,060	.....	540	.....	415	250	.....	250	.....	19,200

NOTE.—Daily discharge computed from a rating curve fairly well defined between 1,400 and 19,000 second-feet. Low-water estimates below 1,000 second-feet are very uncertain.

Monthly discharge of Black Warrior River near Cordova, Ala., for 1909–1911.

[Drainage area, 1,900 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1909.						
January	13,900	915	4,410	2.32	2.68	B.
February	31,200	995	13,200	6.95	7.24	C.
March	60,400	3,290	18,000	9.47	10.92	C.
April	19,900	1,850	6,320	3.33	3.72	B.
May	12,000	1,170	3,040	1.60	1.84	B.
June	30,400	2,160	9,830	5.17	5.77	C.
July	4,520	540	1,430	.753	.87	C.
August	2,540	290	1,020	.537	.62	C.
September	835	155	282	.148	.17	C.
October	610	140	236	.124	.14	C.
November	470	140	226	.119	.13	C.
December	2,380	240	700	.368	.42	C.
The year	60,400	140	4,830	2.54	34.52	
1910.						
January	14,800	398	2,740	1.44	1.66	B.
February	18,200	730	3,680	1.94	2.02	B.
March	13,200	612	3,210	1.69	1.95	B.
April	2,380	465	788	.415	.46	C.
May	11,100	332	2,400	1.26	1.45	B.
June	9,950	575	2,380	1.25	1.40	B.
July	13,900	810	4,740	2.49	2.87	B.
August	6,470	190	1,090	.574	.66	C.
September	895	28	190	.100	.11	D.
October	2,830	110	650	.342	.39	C.
November	190	110	143	.075	.08	D.
December	7,150	145	1,060	.558	.64	C.
The year	18,200	28	1,920	1.01	13.69	
1911.						
January	43,200	880	5,560	2.93	3.38	C.
February	20,400	1,280	5,500	2.89	3.01	B.
March	10,100	955	2,760	1.45	1.67	B.
April	40,900	1,190	11,000	5.79	6.46	C.
May	4,000	540	1,560	.821	.95	C.
June	1,850	205	534	.281	.31	D.
July	2,270	300	801	.422	.49	C.
August	2,160	250	816	.429	.49	C.
September	670	130	265	.139	.16	D.
October	3,520	100	520	.274	.32	D.
November	1,190	100	377	.198	.22	D.
December	28,900	355	8,880	4.67	5.38	C.
The year	43,200	100	3,200	1.68	22.84	

PEARL RIVER BASIN.

PEARL RIVER AT JACKSON, MISS.

Location.—At the county highway bridge at Jackson, one-eighth mile above the Alabama & Vicksburg Railway bridge; about 5 miles above the mouth of Richland Creek.

Records available.—June 24, 1901, to December 31, 1911.

Drainage area.—3,120 square miles.

Gage.—Standard chain gage attached to the highway bridge; datum unchanged.

Channel.—The channel is somewhat obstructed by old piles. The right bank is high and does not overflow. The left bank is of cleared ground and overflows for several hundred feet at a stage of about 20 feet.

Discharge measurements.—Made from the highway bridge.

Artificial control.—The flow is subject to little or no artificial control above or near the station.

Accuracy.—Some slight changes in the controlling section may affect the accuracy of low-water estimates.

Cooperation.—Gage heights are furnished by the United States Weather Bureau.

Discharge measurements of Pearl River at Jackson, Miss., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Aug. 18	R. E. Robertson	5.22	1,870
18	.....do	5.26	1,850

Daily gage height, in feet, of Pearl River at Jackson, Miss., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.8	4.6	6.9	2.9	10.0	2.3	4.3	3.9	2.4	0.7	0.3	0.7
2	14.4	4.3	5.9	2.9	11.5	2.1	4.2	4.1	2.2	.7	.3	.8
3	17.4	4.1	5.2	2.9	12.4	1.8	4.3	3.2	2.8	.7	.3	.8
4	18.9	4.2	4.6	3.0	12.8	1.5	5.7	3.0	2.4	.7	.2	.9
5	20.2	4.2	4.2	2.8	12.2	1.5	4.7	3.9	2.2	.6	.2	.9
6	20.2	3.9	4.0	2.5	10.2	1.4	4.6	4.6	2.0	.6	.3	1.0
7	20.0	3.6	3.8	3.5	8.9	1.3	4.8	5.0	1.8	.6	.3	1.2
8	19.5	3.5	3.6	7.4	7.8	1.3	5.1	4.5	1.7	.6	.5	1.1
9	19.3	3.8	4.0	14.0	6.9	1.3	5.2	3.9	2.3	.5	.6	1.2
10	20.6	5.4	3.8	15.2	6.1	1.2	4.1	3.5	2.1	.5	.7	1.1
11	21.2	6.1	3.5	17.1	5.7	1.1	3.1	3.1	2.0	.5	.7	1.1
12	21.1	8.4	3.2	19.4	4.6	1.4	2.7	2.8	1.9	.5	.8	1.1
13	20.3	8.9	2.9	20.4	4.2	1.5	2.6	5.4	1.7	.5	1.2	2.1
14	18.0	9.4	2.8	21.4	3.6	1.3	2.4	4.9	1.9	.5	1.3	3.0
15	15.3	10.4	2.7	22.1	3.5	1.2	2.5	3.1	1.7	.4	1.5	7.2
16	12.2	11.2	2.6	22.6	3.1	1.0	4.1	2.8	1.7	.4	1.4	8.9
17	9.6	11.7	2.5	22.4	2.8	.9	3.5	3.9	1.7	.4	1.4	7.8
18	8.7	11.9	2.4	22.0	2.5	.8	4.8	4.9	1.6	.4	1.3	7.4
19	7.1	11.9	2.2	21.7	1.9	.9	5.3	5.5	1.6	.4	1.3	8.2
20	6.0	12.0	2.2	21.6	2.2	1.3	5.6	4.6	1.5	.4	1.2	9.0
21	5.4	11.8	2.2	21.0	2.1	1.1	5.6	4.5	1.5	.4	1.2	10.1
22	4.5	11.1	2.2	20.3	1.9	.9	5.4	5.1	1.3	.3	1.1	10.5
23	4.2	10.1	2.1	18.9	1.7	.9	5.3	5.8	1.3	.3	1.1	14.0
24	4.1	9.6	2.0	16.8	1.6	1.0	4.1	5.9	1.2	.3	1.0	14.0
25	4.0	8.9	2.1	14.3	1.4	1.2	4.9	5.3	1.0	.3	.9	13.8
26	3.8	8.5	2.2	12.4	1.4	1.7	5.6	4.6	1.0	.3	.8	14.0
27	3.7	7.9	2.2	10.3	1.2	2.9	6.4	4.5	.9	.3	.8	17.5
28	4.0	7.9	2.2	10.6	1.4	4.3	6.5	3.6	.8	.3	.9	16.0
29	3.4	.....	2.2	9.5	1.5	4.6	6.2	3.2	.7	.3	.8	17.1
30	4.1	.....	2.2	8.3	1.6	4.6	5.6	2.6	.7	.3	.7	16.9
31	4.4	.....	2.6	.....	1.9	.....	4.6	2.5	.....	.3	.....	18.4

Daily discharge, in second-feet, of Pearl River at Jackson, Miss., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,220	1,580	2,800	830	4,640	590	1,450	1,270	630	145	100	145
2	7,580	1,450	2,260	830	5,610	520	1,400	1,360	555	145	100	160
3	9,820	1,360	1,870	830	6,200	415	1,450	955	790	145	100	160
4	11,000	1,400	1,580	870	6,460	320	2,140	870	630	145	90	180
5	12,200	1,400	1,400	790	6,060	320	1,630	1,270	555	130	90	180
6	12,200	1,270	1,320	670	4,760	290	1,580	1,580	485	130	100	200
7	12,000	1,140	1,220	1,090	3,980	265	1,680	1,770	415	130	100	240
8	11,600	1,090	1,140	3,080	3,320	265	1,820	1,540	380	130	120	220
9	11,400	1,220	1,320	7,300	2,800	265	1,870	1,270	590	120	130	240
10	12,500	1,980	1,220	8,140	2,360	240	1,360	1,090	520	120	145	220
11	14,000	2,360	1,090	9,580	2,140	220	910	910	485	120	145	220
12	13,000	3,680	955	11,500	1,580	290	750	790	450	120	160	220
13	12,300	3,980	830	12,400	1,400	320	710	1,980	380	120	240	520
14	10,300	4,280	790	13,300	1,140	265	630	1,720	450	120	265	870
15	8,210	4,900	750	14,000	1,090	240	670	910	380	110	320	2,970
16	6,060	5,420	710	14,600	910	200	1,360	790	380	110	290	3,980
17	4,400	5,740	670	14,300	790	180	1,090	1,270	380	110	290	3,320
18	3,860	5,870	630	13,900	670	160	1,680	1,720	350	110	265	3,080
19	2,920	5,870	555	13,600	450	180	1,920	2,040	350	110	265	3,560
20	2,310	5,940	555	13,500	555	265	2,090	1,580	320	110	240	4,040
21	1,980	5,800	555	12,900	520	220	2,090	1,540	320	110	240	4,700
22	1,540	5,350	555	12,300	450	180	1,980	1,820	265	100	220	4,960
23	1,400	4,700	520	11,000	380	180	1,920	2,200	265	100	220	7,300
24	1,360	4,400	485	9,340	350	200	1,360	2,260	240	100	200	7,300
25	1,320	3,980	520	7,510	290	240	1,720	1,920	200	100	180	7,160
26	1,220	3,740	555	6,200	290	380	2,090	1,580	200	100	160	7,300
27	1,180	3,380	555	4,830	240	830	2,530	1,540	180	100	160	9,900
28	1,320	3,380	555	5,020	290	1,450	2,580	1,140	160	100	180	8,700
29	1,040	.....	555	4,340	320	1,580	2,420	955	145	100	160	9,580
30	1,360	.....	555	3,620	350	1,580	2,090	710	145	100	145	9,420
31	1,500	.....	710	.....	450	.....	1,580	670	.....	100	.....	10,600

NOTE.—Daily discharge computed from a fairly well defined rating curve.

Monthly discharge of Pearl River at Jackson, Miss., for 1911.

[Drainage area, 3,120 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	14,000	1,040	6,260	2.01	2.32	B.
February	5,940	1,090	3,450	1.11	1.16	B.
March	2,800	485	961	.308	.36	B.
April	14,600	670	7,740	2.48	2.77	B.
May	6,460	240	1,960	.628	.72	B.
June	1,580	160	422	.135	.15	B.
July	2,580	630	1,630	.522	.60	B.
August	2,260	670	1,390	.446	.51	B.
September	790	145	386	.124	.14	B.
October	145	100	116	.037	.04	C.
November	320	90	181	.058	.06	C.
December	10,600	145	3,600	1.15	1.33	B.
The year	14,600	90	2,330	.747	10.16	

MISCELLANEOUS MEASUREMENTS.

The following miscellaneous discharge measurements were made in south Atlantic coast and eastern Gulf of Mexico drainage basins during 1911:

Miscellaneous measurements in south Atlantic coast and eastern Gulf of Mexico drainage basins in 1911.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
July 29	Roanoke River	Albemarle Sound	Randolph, Va	3.28	8.76
Dec. 10	do	do	Weldon, N. C	10.56	3,440
Oct. 4	Beech Creek	Chattahoochee River.	Young's Mills, about 5 miles north of La Grange, Ga.		2.9
4	do	do	do		2.7
26	Allatoona Creek	Etowah River	Alabama wagon bridge, one-fourth mile east of Allatoona, Ga.		14
7	Etowah River	Alabama River	Milford Shoals, about 1 mile above the regular gaging station at Ball Ground, Ga.	.37	183
7	do	do	do	.47	186

SUMMARY OF DISCHARGE PER SQUARE MILE.

The following summary of discharge per square mile is given to allow ready comparison of relative rates of run-off from different areas in the south Atlantic coast and eastern Gulf of Mexico drainage basins. It shows in a general way the seasonal distribution of run-off and the effect of snow, ground, surface, and artificial storage. But the most important fact worth noting is the almost entire lack of uniformity or agreement between any two stations. It indicates that the discharge of each stream is a law unto itself and that all projects dependent upon stream flow, if they are to be developed along the safest and most economical lines, must be based on records of stream flow collected with great care over a long series of years as near the location of the project under consideration as possible.

Summary of discharge, in second-feet per square mile, of south Atlantic coast and eastern Gulf of Mexico drainage basins for 1911.

	Drainage area (square miles).	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
James River at Buchanan, Va.	2,060	2.38	1.52	2.13	3.75	0.631	0.427	0.317	0.343	0.519	1.13	0.913	1.17	1.27
James River at Cartersville, Va.	6,230	1.73	1.33	1.25	2.17	.591	.368	.279	.242	.549	.689	.833	1.34	.944
Roanoke River at Roanoke, Va.	388	1.32	1.05	1.70	2.53	.559	.513	.492	.276	.284	.549	.546	1.38	.933
Yadkin River near Salisbury, N. C.	3,400	.....	.....	.....	.....	.....	.....	.....	.....	.756	1.28	.935	1.44	.....
Tallulah River at Tallulah Falls, Ga.	191	2.97	2.30	2.10	5.97	2.93	1.73	1.51	1.55	1.35	1.92	2.09	3.00	2.45
Broad River (of Georgia) near Carlton, Ga.	762	1.23	1.13	1.05	2.14	.881	.988	.959	.966	1.13	1.21	1.28	2.32	1.27
Ocmulgee River near Jackson, Ga.	1,400	.487	.864	.793	1.32	.598	.317	.688	.850	.273	.964	1.24	1.72	.843
Ocmulgee River at Macon, Ga.	2,420	.566	.657	.595	1.06	.504	.307	.616	.711	.255	1.02	.992	1.62	.744
Oconee River near Greensboro, Ga.	1,100	.813	.885	.746	1.66	.667	.424	1.40	1.35	.411	.945	1.35	1.95	1.05
Oconee River at Fraleys Ferry, near Milledgeville, Ga.	2,840	.820	.768	.711	1.19	.535	.384	.824	.820	.335	.982	1.05	1.74	.849
Oconee River at Dublin, Ga.	4,180	.804	.732	.703	1.26	.455	.380	.742	.758	.443	.761	1.08	2.21	.861
Chattahoochee River near Norcross, Ga.	1,170	1.71	1.26	1.23	3.09	1.45	.966	1.13	1.02	.702	1.26	1.52	1.97	1.44
Flint River near Woodbury, Ga.	1,090	.945	1.03	.743	1.17	.542	.301	.543	.899	.252	.377	.817	1.49	.759
Flint River near Culloden, Ga.	2,000	.....	.....	.....	.....	.....	.....	.488	.740	.240	.590	.655	1.44	.....
Flint River near Montezuma, Ga.	2,700	.974	.948	.722	1.06	.589	.364	.559	.774	.347	.574	.804	1.42	.759
Flint River at Albany, Ga.	5,000	.954	.794	.610	.910	.528	.328	.498	.664	.372	.476	.644	1.91	.726
Flint River at Bainbridge, Ga.	7,410	.710	.634	.544	.765	.526	.432	.528	.549	.424	.445	.563	.....	.....
Pea River at Pera, Ala.	1,180	1.26	.753	.707	1.27	.513	.275	.373	.381	.214	.257	.341	1.45	.650
Conecuh River at Beck, Ala.	1,290	1.22	.714	.653	2.22	.730	.340	.457	.436	.247	.207	.253	.775	.688
Oostanaula River at Resaca, Ga.	1,610	2.41	2.27	1.33	3.55	1.22	.777	.814	.519	.306	.708	.895	1.79	1.37
Coosa River at Riverside, Ala.	7,060	1.88	1.56	1.02	3.44	.878	.499	.865	.904	.326	.568	.793	1.78	1.21
Alabama River at Selma, Ala.	15,400	1.84	1.51	.935	2.56	1.10	.566	.864	.766	.382	.426	.727	1.42	1.09
Etowah River near Ball Ground, Ga.	466	1.86	1.31	1.34	3.80	1.59	.968	1.11	.981	.682	1.56	1.60	1.88	1.56
Etowah River near Rome, Ga.	1,800	1.52	1.11	.950	3.23	.939	.644	1.07	.806	.463	1.02	1.19	1.22	1.18
Amicalola River near Potts Mountain, Ga.	80	2.56	1.79	1.79	6.50	2.56	1.75	1.78	1.68	1.10	2.09	2.11	2.68	2.36
Tallapoosa River at Sturdevant, Ala.	2,460	1.87	1.54	.967	2.17	.948	.549	1.32	.984	.329	.345	.935	1.38	1.11
Tombigbee River at Columbus, Miss.	4,440	1.69	1.59	1.20	5.81	.856	.209	.595	.588	.138	.086	.171	3.02	1.32
Tombigbee River at Epes, Ala.	8,830	1.47	1.27	.851	3.17	.948	.205	.624	.460	.161	.109	.239	2.39	.990
Black Warrior River near Cordova, Ala.	1,900	2.93	2.89	1.45	5.79	.821	.281	.422	.429	.139	.274	.198	4.67	1.68
Pearl River at Jackson, Miss.	3,120	2.01	1.11	.308	2.48	.628	.135	.522	.446	.124	.037	.058	1.15	.747

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DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, DIRECTOR

WATER-SUPPLY PAPER 303

SURFACE WATER SUPPLY OF THE UNITED STATES

1911

PART III. THE OHIO RIVER BASIN

PREPARED UNDER THE DIRECTION OF M. O. LEIGHTON

BY

A. H. HORTON, M. R. HALL, AND H. J. JACKSON

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SURFACE WATER SUPPLY OF THE OHIO RIVER BASIN, 1911.

By A. H. Horton, M. R. Hall, and H. J. Jackson.

AUTHORIZATION OF WORK.

This volume is Part III of a series of 12 reports presenting results of measurements of flow made on certain streams in the United States during the calendar year 1911. The reports are listed below.

Papers on surface water supply of the United States, 1911.

Part.[a]	No.	Title.
I	301	North Atlantic coast.
II	302	South Atlantic coast and eastern Gulf of Mexico.
III	303	Ohio River basin.
IV	304	St. Lawrence River basin.
V	305	Upper Mississippi River and Hudson Bay basins.
VI	306	Missouri River basin.
VII	307	Lower Mississippi River basin.
VIII	308	Western Gulf of Mexico.
IX	309	Colorado River basin.
X	310	Great Basin.
XI	311	Pacific coast in California.
XII	312	North Pacific coast.

[a] For the purpose of uniformity in the presentation of reports, a general plan has been agreed upon by the United States Reclamation Service, the United States Forest Service, the United States Weather Bureau, and the United States Geological Survey, according to which the area of the United States has been divided into 12 parts, whose boundaries coincide with natural drainage lines indicated by the parts of the report.

The data presented in these reports were collected by the United States Geological Survey under authority implied in the organic law (20 Stat. L., p. 394), which contains the following paragraph:

Provided, That this officer [the Director] shall have the direction of the geological survey and the classification of public lands and examination of the geological structure, mineral resources, and products of the national domain.

The work was begun in 1888 in connection with special studies of water supply for irrigation. Since the fiscal year ending June 30, 1895, successive sundry civil bills passed by Congress have carried the following item and appropriations:

For gaging the streams and determining the water supply of the United States, and for the investigation of underground currents and artesian wells, and for the preparation of reports upon the best methods of utilizing the water resources.

Annual appropriations for the fiscal year ending June 30—

1895	$12,500
1896	20,000
1897 to 1900, inclusive	50,000
1901 to 1902, inclusive	100,000
1903 to 1906, inclusive	200,000
1907	150,000
1908 to 1910, inclusive	100,000
1911 to 1913, inclusive	150,000

In the execution of the work many private and State organizations have cooperated. Acknowledgments for such cooperation is made on page 13 and also in connection with the description of each station affected by the cooperative work.

PUBLICATIONS.

Measurements of stream flow have been made at more than 2,000 points in the United States and also at many points in small areas in Seward Peninsula and the Yukon-Tanana region, Alaska, and in the Hawaiian Islands. During 1911 gaging stations were maintained by the Survey and the cooperating organizations at about 1,500 points in the United States, and many discharge measurements were made at other points. In connection with this work data were also collected in regard to precipitation, evaporation, storage reservoirs, river profiles, and water power in many sections of the country and will be made available in the regular surface water supply papers from time to time. A complete list of the gaging stations maintained by the Survey to and including 1910 and a list of the papers relating to the water supply of the country has been published as Water-Supply Paper 280. An index to the reports containing stream-flow measurements prior to 1904 has been published as Water-Supply Paper 119.

For each calendar year there has been prepared a report embodying the stream-flow data collected during that year, which has been published either as a part of the annual report of the Director, as a bulletin, or as a water-supply paper, as shown by the following table:

Stream-flow data in reports of the United States Geological Survey.

[A=Annual Report; B=Bulletin; WS=Water-Supply Paper.]

Report.	Character of data.	Year.
10th A, pt. 2	Descriptive information only	
11th A, pt. 2	Monthly discharge	1884, to Sept., 1890.
12th A, pt. 2	do	1884 to June 30, 1891.
13th A, pt. 3	Mean discharge in second-feet	1884 to Dec. 31, 1892.
14th A, pt. 2	Monthly discharge (long-time records, 1871 to 1893)	1888 to Dec. 31, 1893.
B 131	Descriptions, measurements, gage heights, and ratings	1893 and 1894.
16th A, pt. 2	Descriptive information only	
B 140	Descriptions, measurements, gage heights, ratings, and monthly discharge (also many data covering earlier years).	1895.
WS 11	Gage heights (also gage heights for earlier years)	1896.
18th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also similar data for some earlier years).	1895 and 1896.
WS 15	Descriptions, measurements, and gage heights, eastern United States, eastern Mississippi River, and Missouri River above junction with Kansas.	1897.
WS 16	Descriptions, measurements, and gage heights, western Mississippi River below junction of Missouri and Platte, and western United States.	1897.
19th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also some long-time records).	1897.
WS 27	Measurements, ratings, and gage heights, eastern United States, eastern Mississippi River, and Missouri River.	1898.
WS 28	Measurements, ratings, and gage heights, Arkansas River and western United States.	1898.

Stream-flow data in reports of the United States Geological Survey—Continued.

Report.	Character of data.	Year.
20th A, pt. 4	Monthly discharge (also for many earlier years)	1898.
WS 35 to 39	Descriptions, measurements, gage heights, and ratings	1899.
21st A, pt. 4	Monthly discharge	1899.
WS 47 to 52	Descriptions, measurements, gage heights, and ratings	1900.
22d A, pt. 4	Monthly discharge	1900.
WS 65, 66	Descriptions, measurements, gage heights, and ratings	1901.
WS 75	Monthly discharge	1901.
WS 82 to 85	Complete data	1902.
WS 97 to 100	do	1903.
WS 124 to 135	do	1904.
WS 165 to 178	do	1905.
WS 201 to 214	Complete data, except descriptions	1906.
WS 241 to 252	Complete data	1907–8.
WS 261 to 272	do	1909.
WS 281 to 292	do	1910.
WS 301 to 312	do	1911.

NOTE.—No data regarding stream flow are given in the 15th and 17th annual reports.

The table which follows gives, by years and drainage basins, the numbers of the papers on surface-water supply published from 1899 to 1911. The data for any particular station will be found in the reports covering the years during which the station was maintained. For example, data for Machias River at Whitneyville, Me., 1903 to 1911, are published in Water-Supply Papers 97, 124, 165, 201, 241, 261, 281, and 301, which contain records for the New England streams from 1903 to 1911.

Number of water-supply papers containing results of stream measurements, 1899–1911.

	1899 [a]	1900 [b]	1901	1902	1903	1904	1905	1906	1907–8	1909	1910	1911
North Atlantic coast (St. John River to York River)	35	47, [c] 48	65, 75	82	97	[d] 124, [e] 125, [f] 126	[d] 165, [e] 166, [f] 167	[d] 201, [e] 202, [f] 203	241	261	281	301
South Atlantic coast and eastern Gulf of Mexico (James River to the Mississippi)	[g] 35, 36	48	65, 75	[g] 82, 83	[g] 97, 98	[f] 126, 127	[f] 167, 168	[f] 203, 204	242	262	282	302
Ohio River basin	36	48, [h] 49	65, 75	83	98	128	169	205	243	263	283	303
St. Lawrence River and Great Lakes	36	49	65, 75	[i] 82, 83	97	129	170	206	244	264	284	304
Hudson Bay and upper Mississippi River	36	49	[j] 65, 66, 75	[j] 83, 85	[j] 98, 99, [k] 100	[j] 128, 130	171	207	245	265	285	305
Missouri River	[l] 36, 37	49, [m] 50	66, 75	84	99	130, [n] 131	172	208	246	266	286	306
Lower Mississippi River	37	50	[j] 65, 66, 75	[j] 83, 84	[j] 98, 99	[j] 128, 131	[j] 169, 173	[j] 205, 209	247	267	287	307
Western Gulf of Mexico	37	50	66, 75	84	99	132	174	210	248	268	288	308
Colorado River	[o] 37, 38	50	66, 75	85	100	133	175, [p] 177	211	249	269	289	309
Great Basin	38, [q] 39	51	66, 75	85	100	133, [r] 134	176, [r] 177	212, [r] 213	250, [r] 251	270, [r] 271	290	310
Pacific coast in California	38, [s] 39	51	66, 75	85	100	134	177	213	251	271	291	311
North Pacific coast	38	51	66, 75	85	100	135	[t] 177, 178	214	252	272	292	312

[a] Rating tables and index to Water-Supply Papers 35–39 continued in Water-Supply Paper 39.
[b] Rating tables and index to Water-Supply Papers 47–52 and data on precipitation, wells, and irrigation in California and Utah contained in Water-Supply Paper 52.
[c] Wissahickon and Schuylkill rivers to James River.
[d] New England rivers only.
[e] Hudson River to Delaware River, inclusive.
[f] Susquehanna River to Yadkin River, inclusive.
[g] James River only.
[h] Scioto River.
[i] Lake Ontario and tributaries to St. Lawrence River proper.
[j] Tributaries of Mississippi from east.
[k] Hudson Bay only.
[l] Galatin River.
[m] Loup and Platte rivers near Columbus, Nebr., and all tributaries below junction with Platte.
[n] Platte and Kansas rivers.
[o] Green and Gunnison rivers and Grand River above junction with Gunnison.
[p] Below junction with Gila.
[q] Mohave River only.
[r] Great Basin in California, excepting Truckee and Carson drainage basins.
[s] Kings and Kern rivers and south Pacific coast drainage basins.
[t] Rogue, Umpqua, and Siletz rivers only.

DEFINITION OF TERMS.

The volume of water flowing in a stream—the "run-off" or "discharge"—is expressed in various terms, each of which has become associated with a certain class of work. These terms may be divided into two groups—(1) those which represent a rate of flow, as second-feet, gallons per minute, miner's inches, and run-off in second-feet per square mile, and (2) those which represent the actual quantity of water, as run-off in depth in inches, and acre-feet. The units used in this series of reports are second-feet, second-feet per square mile, run-off in depth in inches, and acre-feet. They may be defined as follows:

"Second-foot" is an abbreviation for cubic foot per second and is the unit for the rate of discharge of water flowing in a stream 1 foot wide, 1 foot deep, at a rate of 1 foot per second. It is generally used as a fundamental unit from which others are computed by the use of the factors given in the accompanying table of equivalents.

"Second-feet per square mile" is the average number of cubic feet of water flowing per second from each square mile of area drained, on the assumption that the run-off is distributed uniformly both as regards time and area.

"Run-off, depth in inches," is the depth to which the drainage area would be covered if all the water flowing from it in a given period were conserved and uniformly distributed on the surface. It is used for comparing run-off with rainfall, which is usually expressed in depth in inches.

An "acre-foot" is equivalent to 43,560 cubic feet, and is the quantity required to cover an acre to the depth of 1 foot. The term is commonly used in connection with storage for irrigation.

CONVENIENT EQUIVALENTS.

The following is a list of convenient equivalents for use in hydraulic computations:

Table for converting discharge in second-feet per square mile into run-off in depth in inches over the area.

Discharge (second-feet per square mile).	Run-off (depth in inches).				
	1 day.	28 days.	29 days.	30 days.	31 days.
1.....	0.03719	1.041	1.079	1.116	1.153
2.....	.07438	2.083	2.157	2.231	2.306
3.....	.11157	3.124	3.236	3.347	3.459
4.....	.14876	4.165	4.314	4.463	4.612
5.....	.18595	5.207	5.393	5.578	5.764
6.....	.22314	6.248	6.471	6.694	6.917
7.....	.26033	7.289	7.550	7.810	8.070
8.....	.29752	8.331	8.628	8.926	9.223
9.....	.33471	9.372	9.707	10.041	10.376

NOTE.—For partial month multiply the values for 1 day by the number of days.

Table for converting discharge in second-feet into run-off in acre-feet.

Discharge (second-feet).	Run-off (acre-feet).				
	1 day.	28 days.	29 days.	30 days.	31 days.
1.....	1.983	55.54	57.52	59.50	61.49
2.....	3.967	111.1	115.0	119.0	123.0
3.....	5.950	166.6	172.6	178.5	184.5
4.....	7.934	222.1	230.1	238.0	246.0
5.....	9.917	277.7	287.6	297.5	307.4
6.....	11.90	333.2	345.1	357.0	368.9
7.....	13.88	388.8	402.6	416.5	430.4
8.....	15.87	444.3	460.2	476.0	491.9
9.....	17.85	499.8	517.7	535.5	553.4

NOTE.—For partial month multiply values for 1 day by the number of days.

1 second-foot equals 40 California miner's inches (law of March 23, 1901).
1 second-foot equals 38.4 Colorado miner's inches.
1 second-foot equals 40 Arizona miner's inches.
1 second-foot equals 7.48 United States gallons per second; equals 448.8 gallons per minute; equals 646,317 gallons for one day.
1 second-foot for one year covers 1 square mile 1.131 feet or 13.572 inches deep.
1 second-foot for one year equals 31,536,000 cubic feet.
1 second-foot equals about 1 acre-inch per hour.
1 second-foot for one day equals 86,400 cubic feet.
1,000,000,000 (1 United States billion) cubic feet equals 11,570 second-feet for one day.
1,000,000,000 cubic feet equals 414 second-feet for one 28-day month.
1,000,000,000 cubic feet equals 399 second-feet for one 29-day month.
1,000,000,000 cubic feet equals 386 second-feet for one 30-day month.
1,000,000,000 cubic feet equals 373 second-feet for one 31-day month.
100 California miner's inches equals 18.7 United States gallons per second.
100 California miner's inches for one day equals 4.96 acre-feet.
100 Colorado miner's inches equals 2.60 second-feet.
100 Colorado miner's inches equals 19.5 United States gallons per second.
100 Colorado miner's inches for one day equals 5.17 acre-feet.
100 United States gallons per minute equals 0.223 second-foot.
100 United States gallons per minute for one day equals 0.442 acre-foot.
1,000,000 United States gallons per day equals 1.55 second-feet.
1,000,000 United States gallons equals 3.07 acre-feet.
1,000,000 cubic feet equals 22.95 acre-feet.
1 acre-foot equals 325,850 gallons.
1 inch deep on 1 square mile equals 2,323,200 cubic feet.
1 inch deep on 1 square mile equals 0.0737 second-foot per year.
1 foot equals 0.3048 meter.
1 mile equals 1.60935 kilometers.
1 mile equals 5,280 feet.
1 acre equals 0.4047 hectare.
1 acre equals 43,560 square feet.
1 acre equals 209 feet square, nearly.
1 square mile equals 2.59 square kilometers.
1 cubic foot equals 0.0283 cubic meter.
1 cubic foot of water weighs 62.5 pounds.
1 cubic meter per minute equals 0.5886 second-foot.
1 horsepower equals 550 foot-pounds per second.

1 horsepower equals 76.0 kilogram-meters per second.
1 horsepower equals 746 watts.
1 horsepower equals 1 second-foot falling 8.80 feet.
1⅓ horsepower equal about 1 kilowatt.

To calculate water power quickly: $\frac{\text{Sec.-ft.} \times \text{fall in feet}}{11}$ = net horsepower on water wheel realizing 80 per cent of theoretical power.

EXPLANATION OF DATA.

For each regular current-meter gaging station the following data, so far as available, are given: Description of the station, list of discharge measurements, table of daily gage heights, table of daily discharge, table of monthly and yearly discharge and run-off. For stations located at weirs or dams the gage-height table is omitted.

In addition to statements regarding the location and installation of current-meter stations the descriptions give information in regard to any conditions which may affect the constancy of the relation of gage height to discharge, covering such points as ice, logging, shifting channels, and backwater; also information regarding diversions which decrease the total flow at the measuring section. Statements are also made regarding the accuracy and reliability of the data.

The table of daily gage heights records the daily fluctuations of the surface of the river as found from the mean of the gage readings taken each day, usually in the morning and in the evening. The gage height given in the table represents the elevation of the surface of the water above the zero of the gage. All gage heights affected by the presence of ice in the streams or by backwater from obstructions are published as recorded, with suitable footnotes. The rating table is not applicable for such periods unless the proper corrections to the gage heights are known and applied. Attention is called to the fact that the zero of the gage is placed at an arbitrary datum and has no relation to zero flow or the bottom of the river. In general the zero is located somewhat below the lowest known flow, to avoid negative readings.

The discharge measurements and gage heights are the base data from which rating tables, daily-discharge tables, and monthly-discharge tables are computed.

The rating table gives, either directly or by interpolation, the discharge in second-feet corresponding to every stage of the river recorded during the period for which it is applicable. It is not published in this report, but can be determined from the tables of daily gage heights and daily discharge as follows:

First plot the discharge measurements for the current and earlier years on cross-section paper, with gage heights in feet as ordinates and discharge in second-feet as abscissas. Then tabulate a number of gage heights taken from the daily gage-height table for the com-

plete range of stage given and the corresponding discharges for the days selected from the daily-discharge table and plot the values on cross-section paper. The last points plotted will define the rating curve used and will lie among the plotted discharge measurements. After drawing the rating curve a table can be developed by scaling off the discharge in second-feet for each tenth-foot of gage height. These values should be so adjusted that the first differences shall always be increasing or constant except for known backwater periods.

The table of daily discharge gives the discharges in second-feet corresponding to the observed gage heights as determined from the rating tables.

In the table of monthly discharge the column headed "Maximum" gives the mean flow, as determined from the rating table, for the day when the mean gage height was highest. As the gage height is the mean for the day, it does not indicate correctly the stage when the water surface was at crest height, and the corresponding discharge was consequently larger than given in the maximum column. Likewise in the column of "Minimum" the quantity given is the mean flow for the day when the mean gage height was lowest. The column headed "Mean" is the average flow in cubic feet for each second during the month. On this the computations for the remaining columns, which are defined on page 9, are based.

The field methods used in the collection of the data presented in this series of reports are described in the introductory sections of Water-Supply Papers 261 to 272, inclusive, "Surface water supply of the United States, 1909."

Plates I and II show the average precipitation and run-off in the United States, as determined from the measurements of stream flow made by the Geological Survey and records of rainfall collected by the Weather Bureau.

Plate III shows typical gaging stations.

Plate IV shows current meters [1] used in the work.

ACCURACY AND RELIABILITY OF FIELD DATA AND COMPARATIVE RESULTS.

The accuracy of stream-flow data depends primarily on the natural conditions at the gaging station and on the methods and care with which the data are collected. Errors of the first group depend on the degree of permanency of channel and of permanency of the relation between discharge and stage.

Errors of the second class are due, first, to errors in observation of stage; second, to errors in measurements of flow; third, to errors due to misinterpretation of stage and flow data.

[1] See Hoyt, J. C., and others, Use and care of current meter as practiced by the United States Geological Survey: Trans. Am. Soc. Civil Eng., vol. 66, 1910, p. 70.

ENGRAVED AND PRINTED BY THE U. S. GEOLOGICAL SURVEY

MAP OF UNITED STATES, SHOWING MEAN ANNUAL PRECIPITATION

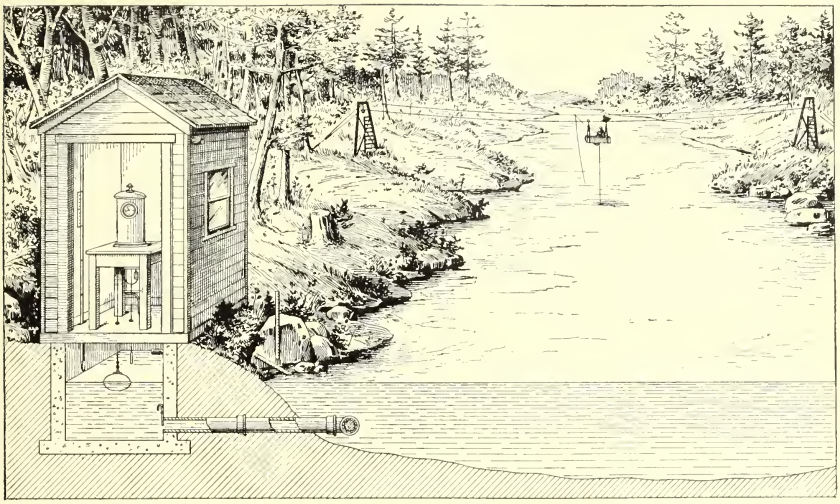
Blue lines and figures indicate average annual precipitation in depth in inches

Prepared by Henry Gannett
mainly from data of the
United States Geological Survey
and United States Weather Bureau

MAP OF UNITED STATES, SHOWING MEAN ANNUAL RUN-OFF

Blue lines and figures indicate average annual run-off in depth in inches

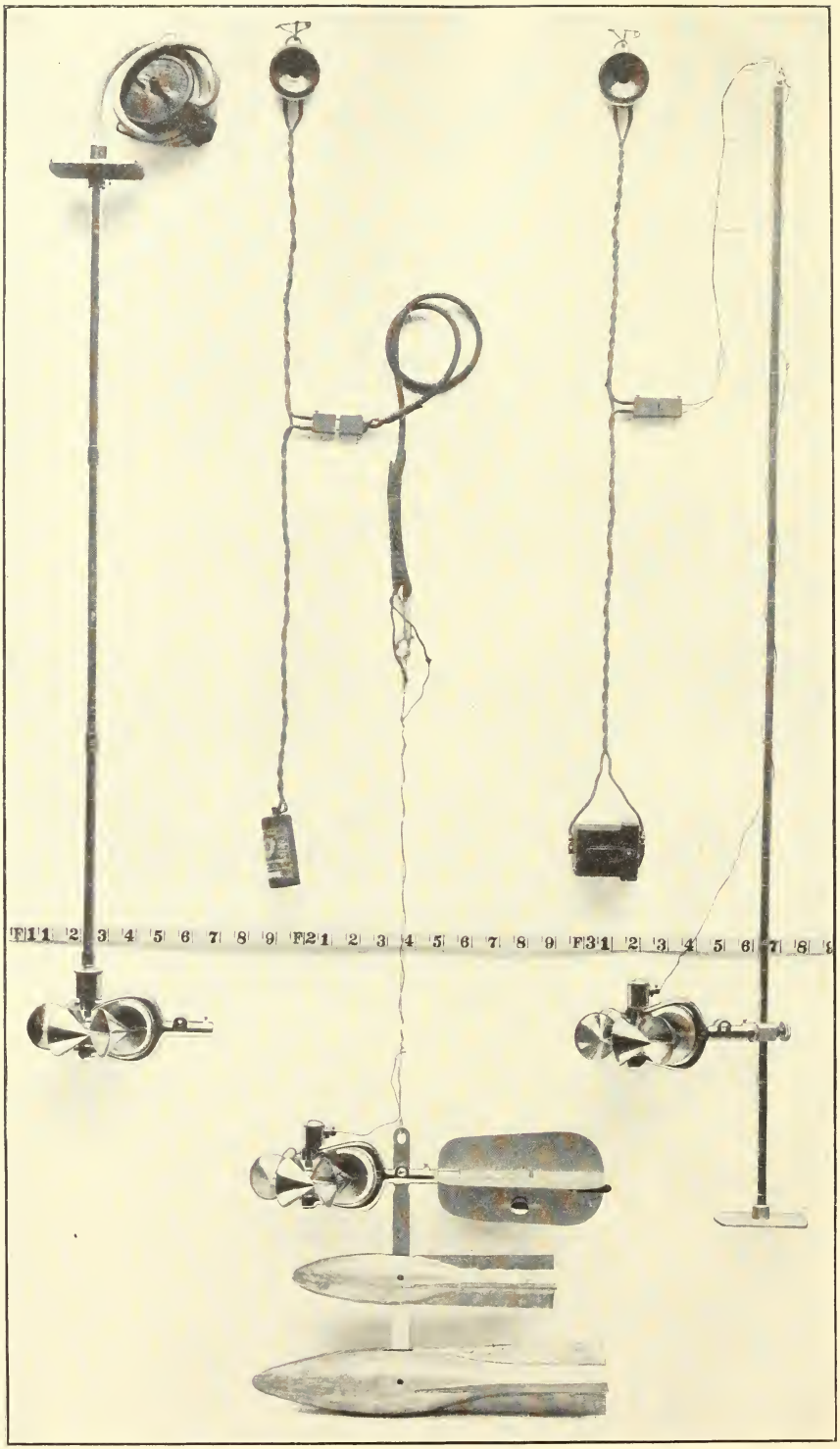
Prepared by Henry Gannett
mainly from data of the
United States Geological Survey



A. CABLE STATION WITH AUTOMATIC GAGE.

B. FOR BRIDGE MEASUREMENT.

TYPICAL GAGING STATIONS.



SMALL PRICE CURRENT METERS.

In order to give engineers and others information regarding the probable accuracy of the computed results, footnotes are added to the daily-discharge tables, stating the probable accuracy of the rating tables used, and an accuracy column is inserted in the monthly-discharge table. For the rating tables "well defined" indicates, in general, that the rating is probably accurate within 5 per cent; "fairly well defined," within 10 per cent; "poorly defined" or "approximate," within 15 to 25 per cent. These notes are very general and are based on the plotting of the individual measurements with reference to the mean rating curve.

The accuracy column in the monthly-discharge table does not apply to the maximum or minimum nor to any individual day, but to the monthly mean. It is based on the accuracy of the rating, the probable reliability of the observer, and knowledge of local conditions. In this column A indicates that the mean monthly flow is probably accurate within 5 per cent; B, within 10 per cent; C, within 15 per cent; D, within 25 per cent. Special conditions are covered by footnotes.

Even though the monthly means for any station may represent with a high degree of accuracy the quantity of water flowing past the gage, the figures showing discharge per square mile and depth of runoff in inches may be subject to gross errors which result from including in the measured drainage area large noncontributing districts or omitting estimates of water diverted for irrigation or other use, and they should, therefore, be considered as only approximate, particularly for periods of irrigation or of low water. For these errors it is as a rule not feasible to make adequate correction.

In general the base data collected each year by the Survey engineers are published not only to comply with the law but to afford any engineer the means of examining and adjusting to his own needs the results of the computations. The table of monthly discharge is so arranged as to give only a general idea of the flow at the station and should not be used for other than preliminary estimates. The determinations of daily discharge allow more detailed studies of the variation in flow by which the period of deficiency may be determined.

It should be borne in mind that the observations in each succeeding year may be expected to throw new light on data already collected and published, and the engineer who makes use of the figures presented in these papers should verify all ratings and make such adjustments for earlier years as may seem necessary.

COOPERATION AND ACKNOWLEDGMENTS.

For assistance rendered and records furnished special acknowledgment is due the members of the United States Corps of Engineers, the United States Weather Bureau, the Water Supply Commission

of Pennsylvania, the Ohio Agricultural Experiment Station, F. W. Scheidenhelm, and the Knoxville Power Co.

The State of Illinois has paid for the stream gaging work in that State, the appropriation being in charge of the Internal Improvement Commission, Isham Randolph, chairman, and the Rivers and Lakes Commission, Robert R. McCormick, chairman.

DIVISION OF WORK.

The field data for Allegheny River at Red House, N. Y., have been collected under the direction of C. C. Covert, district engineer, assisted by F. J. Shuttleworth and C. S. De Golyer.

The field data for the Ohio River drainage basin, with the exception of Allegheny River at Red House, N. Y., and for the Tennessee River drainage basin have been collected under the direction of A. H. Horton, district engineer, assisted by C. T. Bailey, P. S. Monk, and Richard Perwien. Stations in Pennsylvania are now maintained and the stream-flow data collected by the Water Supply Commission of Pennsylvania.

The field data in the Tennessee River drainage basin have been collected under the direction of M. R. Hall, district engineer, assisted by R. E. Robertson.

The ratings, special estimates, and studies of the completed data were made by M. R. Hall, A. H. Horton, R. H. Bolster, and H. J. Jackson. The completed data were prepared for publication by H. J. Jackson, assistant engineer. The computations were made, under the direction of R. H. Bolster and H. J. Jackson, by J. G. Mathers, H. D. Padgett, A. H. Tuttle, H. J. Dean, C. L. Batchelder, W. R. King, and M. I. Walters.

The report was edited by Mrs. B. D. Wood.

STATION RECORDS.

ALLEGHENY RIVER BASIN.

ALLEGHENY RIVER AT RED HOUSE, N. Y.

Location.—At highway bridge at Red House, N. Y., on the road leading from the Pennsylvania Railroad station to the Erie Railroad station; about 5 miles below Salamanca and 13 miles above the State line between New York and Pennsylvania. Conewango Creek, the outlet of Chautauqua Lake, enters the Alleghany in the State of Pennsylvania.

Records available.—September 4, 1903, to December 31, 1911.

Drainage area.—1,640 square miles.

Gage.—Standard chain, attached to the upstream side of bridge near left hand end; datum unchanged.

Channel.—Practically permanent since station was established; broken by three bridge piers. Bed of stream, coarse gravel. Current good for medium and high stages; rather slow at low stages.

Discharge measurements.—Made from downstream side of bridge.

Winter flow.—Ice affects the relation of gage height to discharge for short periods during December, January, February, and March.

Artificial control.—Low-water flow may be slightly affected by the operation of several small power plants above Salamanca. At Olean, N. Y., a wasteway from Cuba reservoir enters the river through Olean Creek. This reservoir is on the divide between Oil Creek, tributary to Allegheny River, and Genesee River, tributary to Lake Ontario. The stored water is commonly turned into Genesee River through the abandoned summit level of Genesee River canal, but may be diverted into Oil Creek through a guard lock at the head of the canal.

Accuracy.—Records good except for three winter months.

Discharge measurements of Allegheny River at Red House, N. Y., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Feb. 14	F. J. Shuttleworth	4.00	1,470
Apr. 19	C. S. De Golyer	5.52	4,360

Daily gage height, in feet, of Allegheny River at Red House, N. Y., for 1911.

[W. E. Coe, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.4	6.3	4.8	5.6	5.2	3.6	3.7	2.95	4.4	5.2	4.25	5.3
2	7.1	5.7	4.7	5.2	5.2	3.65	3.5	3.05	4.4	6.6	4.2	5.5
3	8.8	5.4	4.6	4.9	5.4	3.6	3.35	3.0	4.6	6.4	4.5	5.2
4	8.1	5.2	4.5	5.0	5.2	3.55	3.2	3.0	4.6	6.3	4.25	4.7
5	7.4	4.1	4.25	6.2	4.9	3.55	3.2	3.1	4.6	6.1	4.8	4.5
6	6.8	4.1	4.0	6.8	4.8	3.6	3.2	3.35	5.8	5.4	5.0	4.45
7	5.7	4.2	4.0	8.0	4.8	3.5	3.05	3.85	6.0	4.8	5.2	4.45
8	5.4	4.25	4.2	8.1	4.5	3.45	3.05	3.4	5.9	4.6	5.3	4.3
9	5.6	4.4	4.8	7.7	4.2	3.4	3.25	3.25	5.6	4.6	5.4	4.6
10	6.0	4.3	5.0	7.2	4.25	3.35	3.2	3.2	6.6	4.6	5.4	4.7
11	6.5	4.3	5.2	6.6	4.25	4.2	3.2	3.0	5.6	4.45	5.8	4.8
12	6.9	4.0	5.6	6.6	3.9	4.8	3.45	2.9	5.4	4.6	5.6	5.2
13	7.2	4.05	5.7	6.4	3.8	5.6	3.4	3.1	5.0	4.6	5.6	7.1
14	8.0	4.1	5.8	6.2	3.75	5.7	3.45	3.25	4.5	4.6	5.8	7.4
15	8.6	4.8	6.3	6.2	3.7	5.3	3.3	3.15	4.45	4.7	5.7	7.0
16	8.2	5.1	6.2	6.0	3.7	4.8	3.2	3.6	4.6	4.8	5.9	6.9
17	7.5	5.9	5.4	5.8	3.85	4.3	3.15	3.55	4.25	4.8	6.6	6.0
18	6.8	6.2	5.2	5.5	3.85	4.1	3.15	3.55	4.2	4.7	6.7	5.9
19	6.5	5.8	5.3	5.5	3.8	3.35	3.1	3.55	4.1	4.6	6.6	4.7
20	6.2	5.4	5.4	5.5	3.95	3.3	3.1	3.15	4.15	4.5	6.0	4.6
21	6.0	4.9	5.2	5.8	3.85	3.3	3.0	3.15	3.9	4.2	5.3	5.2
22	5.6	5.0	5.2	6.2	3.7	3.55	3.0	3.3	3.55	4.2	5.3	5.0
23	5.2	5.0	6.2	6.0	3.6	3.5	3.1	3.35	3.55	4.25	5.0	5.1
24	4.0	5.0	5.6	5.7	3.85	3.6	3.0	3.2	3.6	4.25	5.2	5.2
25	5.2	5.0	5.2	5.6	4.75	3.65	3.0	3.25	3.65	4.1	5.4	5.0
26	6.6	4.9	5.6	5.2	5.3	3.6	3.0	3.35	3.65	4.0	5.0	4.8
27	6.8	5.0	6.2	5.2	4.8	3.95	2.9	3.85	3.75	4.0	4.9	4.6
28	9.2	4.9	8.1	5.0	4.0	4.3	2.95	6.4	3.8	3.9	4.9	4.7
29	8.2	.....	7.8	4.8	3.85	3.8	2.8	8.6	3.8	3.95	5.4	5.3
30	7.6	.....	6.6	4.8	3.8	3.65	2.9	7.0	5.3	3.95	5.6	5.6
31	7.0	.....	5.8	.....	3.8	.....	2.9	5.4	.....	4.1	.....	5.4

NOTE.—The extent of effect from ice during January, February, and March is very uncertain. It is quite probable that the relation of gage height to discharge was affected by ice Jan. 21 to 26 and Feb. 22 to 27, and also more or less for other short periods from about Jan. 9 to Mar. 10.

Daily discharge, in second-feet, of Allegheny River at Red House, N. Y., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6,840	6,540	2,720	4,570	3,580	945	1,070	285	2,040	3,580	1,820	3,820
2	9,070	4,830	2,540	3,580	3,580	1,010	825	362	2,040	7,460	1,750	4,320
3	15,700	4,060	2,360	2,920	4,060	945	655	320	2,360	6,840	2,200	3,580
4	12,700	3,580	2,200	3,130	3,580	885	500	320	2,360	6,540	1,820	2,540
5	10,100	1,610	1,820	6,240	2,920	885	500	405	2,360	5,950	2,720	2,200
6	8,090	1,610	1,470	8,090	2,720	945	500	655	5,100	4,060	3,130	2,100
7	4,830	1,750	1,470	12,300	2,720	825	362	1,270	5,660	2,720	3,580	2,122
8	4,060	1,820	1,750	12,700	2,200	768	362	710	5,380	2,360	3,820	1,900
9	4,570	2,040	2,720	11,200	1,750	710	550	550	4,570	2,360	4,060	2,360
10	5,660	1,900	3,130	9,400	1,820	655	500	500	7,460	2,360	4,060	2,540
11	7,150	1,900	3,580	7,460	1,820	1,750	500	320	4,570	2,120	5,100	2,720
12	8,410	1,470	4,570	7,460	1,340	2,720	768	250	4,060	2,360	4,570	3,580
13	9,400	1,540	4,830	6,840	1,200	4,570	710	405	3,130	2,360	4,570	9,070
14	12,300	1,610	5,100	6,240	1,140	4,830	768	550	2,200	2,360	5,100	10,100
15	14,800	2,720	6,540	6,240	1,070	3,820	600	452	2,120	2,540	4,830	8,740
16	13,100	3,350	6,240	5,660	1,070	2,720	500	945	2,360	2,720	5,380	8,410
17	10,400	5,380	4,060	5,100	1,270	1,900	452	885	1,820	2,720	7,460	5,660
18	8,090	6,240	3,580	4,320	1,270	1,610	452	885	1,750	2,540	7,770	5,380
19	7,150	5,100	3,820	4,320	1,200	655	405	885	1,610	2,360	7,460	2,540
20	6,240	4,060	4,060	4,320	1,400	600	405	452	1,680	2,200	5,660	2,360
21	5,000	2,920	3,580	5,100	1,270	600	320	452	1,340	1,750	3,820	3,580
22	3,700	2,000	3,580	6,240	1,070	885	320	600	885	1,750	3,820	3,130
23	2,500	1,500	6,240	5,660	945	825	405	655	885	1,820	3,130	3,350
24	1,470	1,200	4,570	4,830	1,270	945	320	500	945	1,820	3,580	3,580
25	2,500	1,200	3,580	4,570	2,630	1,010	320	550	1,010	1,610	4,060	3,130
26	5,000	1,800	4,570	3,580	3,820	945	320	655	1,010	1,470	3,130	2,720
27	8,090	2,500	6,240	3,580	2,720	1,400	250	1,270	1,140	1,470	2,920	2,360
28	17,400	2,920	12,700	3,130	1,470	1,900	285	6,840	1,200	1,340	2,920	2,540
29	13,100	.....	11,500	2,720	1,270	1,200	190	14,800	1,200	1,400	4,060	3,820
30	10,800	.....	7,460	2,720	1,200	1,010	250	8,740	3,820	1,400	4,570	4,570
31	8,740	.....	5,100	.....	1,200	.....	250	4,060	.....	1,610	.....	4,060

NOTE.—Daily discharge determined from a well-defined discharge rating curve. Discharge has been applied from the open-channel rating curve throughout January, February, and March, except Jan. 21 to 26 and Feb. 22 to 27, for which days it was estimated by means of climatologic records, the discharge at Kittanning, and the records of discharge from adjacent drainage areas. Daily discharge for these three months, particularly at low stages, is uncertain.

Monthly discharge of Allegheny River at Red House, N. Y., for 1911.

[Drainage area, 1,640 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	17,400	1,470	8,290	5.05	5.82	B.
February	6,540	1,200	2,820	1.72	1.79	C.
March	12,700	1,470	4,440	2.71	3.12	A.
April	12,700	2,720	5,810	3.54	3.95	A.
May	4,060	945	1,950	1.19	1.37	A.
June	4,830	600	1,480	.902	1.01	A.
July	1,070	190	471	.287	.33	A.
August	14,800	250	1,630	.994	1.15	A.
September	7,460	885	2,600	1.59	1.77	A.
October	7,460	1,340	2,770	1.69	1.95	A.
November	7,770	1,750	4,100	2.50	2.79	A.
December	10,100	1,900	3,960	2.41	2.78	A.
The year	17,400	190	3,360	2.05	27.83	

ALLEGHENY RIVER AT KITTANNING, PA.

Location.—At the Market Street Bridge in the city of Kittanning, Pa., about 4 miles above the mouth of Crooked River and more than 12 miles above the mouth of Kiskiminitas River.

Records available.—August 18, 1904, to December 31, 1911.

Drainage area.—9,010 square miles. (Revised since last report.)

Gage.—Chain gage attached to bridge; datum unchanged since established.

Channel.—Probably permanent.

Discharge measurements.—Made from downstream side of bridge.

Winter flow.—Ice may affect the relation of gage height to discharge for short periods during December, January, and February. No ice was reported by the observer during 1911.

Accuracy.—Conditions of flow are practically constant and an excellent low and medium stage rating curve has been developed. At high stages numerous measurements have been made. There is, however, a marked difference between the discharge at a given high gage height for rising and for falling stage, due to increase and decrease of slope. The difference at times amounts to as much as 15 per cent, and as the variation differs for each flood it is difficult to determine accurately the daily discharge at high stages. No discharge measurements were made during 1911. The gage was inspected February 21, 1911, and February 2, 1912 (prior to the preparation of this report). The last discharge measurement was made March 5, 1910, and the accuracy of the daily and monthly discharge in the following tables depends upon the permanency of the conditions of flow since that date.

Cooperation.—This station is now maintained by the Water Supply Commission of Pennsylvania, which has furnished the records of gage heights for 1911.

Daily gage height, in feet, of Allegheny River at Kittanning, Pa., for 1911.

[S. B. Cochrane and Blaine Mast, observers.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	11.55	10.50	6.30	8.62	6.83	3.80	4.00	1.55	7.85	11.05	4.95	8.85
2	11.32	9.50	5.50	7.81	7.10	3.78	3.60	1.50	7.00	18.92	5.70	8.25
3	12.50	8.52	5.23	7.40	7.21	3.75	3.35	1.85	6.15	14.40	8.40	7.65
4	14.30	8.30	4.62	7.10	7.51	3.70	3.00	1.95	5.10	11.05	8.60	7.20
5	12.55	7.90	4.12	6.30	6.75	3.55	2.40	1.90	4.45	9.55	8.40	6.80
6	10.80	7.20	3.92	8.90	6.35	3.60	2.10	2.50	7.10	8.60	8.10	6.45
7	9.95	6.50	3.89	10.93	6.00	3.60	2.00	2.85	8.48	8.40	7.75	6.15
8	8.55	5.83	3.46	11.23	5.46	3.55	2.00	2.90	7.90	9.80	7.45	5.85
9	8.10	5.80	3.17	10.95	5.20	3.55	1.95	2.65	8.85	9.05	7.05	5.85
10	7.50	5.73	3.01	10.50	4.92	3.40	1.85	2.30	10.05	8.25	6.75	6.25
11	7.00	5.85	3.87	8.72	4.82	3.50	1.95	2.25	8.53	7.45	6.55	7.75
12	8.77	5.30	4.62	8.35	4.80	3.75	1.95	2.10	7.20	6.80	7.40	9.10
13	13.30	5.30	5.28	7.99	4.75	4.50	1.93	1.95	6.43	6.30	7.50	10.65
14	15.79	5.50	7.24	7.24	4.68	4.95	1.93	1.80	5.85	5.95	7.50	12.05
15	19.20	9.00	8.50	8.76	4.50	4.80	1.82	1.60	12.27	6.05	7.25	13.05
16	16.64	9.80	8.24	8.85	4.52	4.80	1.92	2.60	14.20	5.85	6.95	13.07
17	13.19	9.30	7.92	8.85	4.45	4.60	1.92	3.25	11.75	5.60	6.80	12.10
18	11.30	10.72	7.28	8.15	4.00	4.15	1.90	3.50	10.17	9.75	7.55	10.85
19	9.62	13.85	7.48	8.07	4.32	3.90	1.90	3.30	8.20	11.10	13.85	9.40
20	8.42	12.60	7.12	7.70	4.18	3.60	1.77	2.85	6.65	9.55	11.65	7.75
21	7.80	10.53	7.28	10.32	4.25	3.20	1.85	2.70	5.95	8.30	10.30	7.35
22	7.00	9.00	7.31	9.82	4.20	2.90	1.85	2.50	5.40	7.40	9.50	7.55
23	6.80	7.95	8.89	10.05	4.16	2.55	1.85	2.25	5.00	6.55	8.70	7.65
24	6.50	7.10	8.10	9.42	4.12	2.70	1.90	2.20	4.60	6.30	7.90	8.20
25	5.80	6.90	7.81	8.70	4.00	3.60	1.75	2.20	4.25	5.95	7.05	8.00
26	5.50	6.70	7.45	7.82	4.06	3.90	1.85	3.70	4.05	5.75	7.00	7.55
27	5.80	7.20	8.21	7.25	4.02	4.10	1.80	3.50	4.00	5.50	7.20	7.55
28	11.55	6.40	9.85	6.80	4.00	4.25	1.75	5.10	4.55	5.20	7.55	7.85
29	16.30	.....	11.00	6.49	3.95	4.25	1.75	8.80	6.40	5.00	7.85	7.78
30	14.40	.....	10.01	6.57	3.80	4.10	1.60	13.80	7.45	4.65	9.65	7.05
31	12.50	.....	9.35	.....	3.85	.....	1.65	9.45	.....	4.60	.....	9.45

NOTE.—No ice reported. Relation of gage height to discharge probably not affected by ice.

Daily discharge, in second-feet, of Allegheny River at Kittanning, Pa., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	49,600	41,900	15,200	29,100	18,100	5,410	5,940	1,030	24,200	45,900	9,010	30,600
2	47,800	35,000	11,300	23,900	19,600	5,360	4,900	980	19,000	117,000	12,200	26,700
3	56,900	28,400	10,100	21,400	20,300	5,280	4,280	1,380	14,500	72,600	27,700	22,900
4	71,700	27,000	7,840	19,600	22,100	5,150	3,460	1,520	9,590	45,900	29,000	20,200
5	57,300	24,500	6,280	15,200	17,600	4,780	2,250	1,450	7,280	35,300	27,700	17,900
6	44,100	20,200	5,720	30,900	15,500	4,900	1,740	2,440	19,600	29,000	25,700	16,000
7	38,100	16,300	5,640	45,000	13,700	4,900	1,590	3,140	28,200	27,700	23,500	14,500
8	28,600	12,900	4,550	47,200	11,100	4,780	1,590	3,240	24,500	37,000	21,700	13,000
9	25,700	12,700	3,850	45,100	10,000	4,780	1,520	2,730	30,600	31,900	19,300	13,000
10	22,000	12,400	3,480	41,900	8,900	4,400	1,380	2,070	38,800	26,700	17,600	15,000
11	19,000	13,000	5,590	29,800	8,530	4,650	1,520	1,980	28,500	21,700	16,500	23,500
12	30,100	10,400	7,840	27,300	8,460	5,280	1,520	1,740	20,200	17,900	21,400	32,300
13	63,200	10,400	10,300	25,000	8,280	7,440	1,490	1,520	15,900	15,200	22,000	43,000
14	85,100	11,300	20,400	20,400	8,040	9,010	1,490	1,320	13,000	13,400	22,000	53,400
15	120,000	31,600	28,300	30,000	7,440	8,460	1,350	1,080	55,100	14,000	20,500	61,200
16	93,100	37,000	26,600	30,600	7,510	8,460	1,480	2,630	70,800	13,000	18,800	61,400
17	62,300	33,600	24,600	30,600	7,280	7,770	1,480	4,040	51,100	11,800	17,900	53,800
18	47,700	43,500	20,700	26,100	5,940	6,360	1,450	4,650	39,600	36,700	22,300	44,400
19	35,800	67,800	21,900	25,500	6,870	5,670	1,450	4,160	26,400	46,200	67,800	34,300
20	27,800	57,600	19,700	23,200	6,450	4,900	1,280	3,140	17,100	35,300	50,300	23,500
21	23,800	42,100	20,700	40,600	6,660	3,920	1,380	2,830	13,400	27,000	40,500	21,100
22	19,000	31,600	20,800	37,200	6,510	3,240	1,380	2,440	10,800	21,400	35,000	22,300
23	17,900	24,800	30,900	38,800	6,390	2,540	1,380	1,980	9,200	16,500	29,600	22,900
24	16,300	19,600	25,700	34,400	6,280	2,830	1,450	1,900	7,770	15,200	24,500	26,400
25	12,700	18,500	23,900	29,600	5,940	4,900	1,260	1,900	6,660	13,400	19,300	25,100
26	11,300	17,400	21,700	24,000	6,110	5,670	1,380	5,150	6,080	12,500	19,000	22,300
27	12,700	20,200	26,400	20,500	6,000	6,220	1,320	4,650	5,940	11,300	20,200	22,300
28	49,600	15,700	37,400	17,900	5,940	6,660	1,260	9,590	7,600	10,000	22,300	24,200
29	89,800	.....	45,500	16,200	5,800	6,660	1,260	30,300	15,700	9,200	24,200	23,700
30	72,600	.....	38,500	16,600	5,410	6,220	1,080	67,400	21,700	7,940	36,000	19,300
31	56,900	.....	34,000	.....	5,540	.....	1,140	34,600	.....	7,770	.....	34,600

NOTE.—Daily discharge determined from a rating curve well defined between 980 and 28,300 second-feet (gage heights 1.5 and 8.5 feet) and fairly well defined throughout the remainder of the table covering the range of stage during 1911.

Monthly discharge of Allegheny River at Kittanning, Pa., for 1911.

[Drainage area, 9,010 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	120,000	11,300	45,400	5.04	5.81	B.
February	67,800	10,400	26,300	2.92	3.04	B.
March	45,500	3,480	18,900	2.10	2.42	A.
April	47,200	15,200	28,800	3.20	3.57	B.
May	22,100	5,410	9,620	1.07	1.23	A.
June	9,010	2,540	5,550	.616	.69	A.
July	5,940	1,080	1,850	.205	.24	A.
August	67,400	980	6,740	.748	.86	A.
September	70,800	5,940	22,000	2.44	2.72	A.
October	117,000	7,770	27,300	3.03	3.49	B.
November	67,800	9,010	25,500	2.83	3.16	B.
December	61,400	13,000	28,500	3.16	3.64	B.
The year	120,000	980	20,500	2.28	30.87	

KISKIMINITAS RIVER AT AVONMORE, PA.

Location.—At the highway bridge near Avonmore station on the Pennsylvania Railroad, about 4 miles below the mouth of Blacklegs Creek, about 1 mile above the mouth of Long Run, and about 5 miles below the junction of Conemaugh River with Loyalhanna Creek to form the Kiskiminitas.

Records available.—June 11, 1907, to December 31, 1911.

Drainage area.—1,720 square miles. (Revised since last report.)

Gage.—Chain gage attached to bridge; datum unchanged since established.

Channel.—Probably permanent.

Discharge measurements.—Made from the downstream side of the bridge.

Floods.—The flood of March 19, 1908, reached a height of 30.8 feet on the gage, and its discharge was estimated at 80,500 second-feet, or about 47 second-feet per square mile from a drainage area of 1,720 square miles.

Winter flow.—Ice may affect the relation of gage height to discharge for short periods during December, January, and February.

Accuracy.—The gage was inspected and checked on June 29, 1911, and on February 1, 1912 (prior to the preparation of this report). No discharge measurements were made during 1911. The last discharge measurement was made March 2, 1910, and the accuracy of the daily and monthly discharge tables depends upon the permanency of conditions of flow since that date.

Cooperation.—This station is now maintained by the Water Supply Commission of Pennsylvania, which has furnished the gage heights for 1911.

Daily gage height, in feet, of Kiskiminitas River at Avonmore, Pa., for 1911.

[Ralph Fickes, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.96	8.39	6.44	5.94	5.51	3.33	3.10	1.92	7.25	7.60	3.90	4.52
2	8.62	7.51	6.04	5.59	6.05	3.00	2.82	1.90	5.40	[a]11.05	3.85	4.50
3	10.13	6.69	5.64	5.71	5.78	2.87	2.68	2.12	3.74	8.75	3.65	4.45
4	9.26	6.46	5.39	5.91	5.11	2.74	2.55	2.08	3.65	7.68	3.48	4.35
5	7.21	6.51	5.03	8.59	4.74	2.73	2.42	2.09	3.29	7.00	3.35	4.02
6	9.51	5.91	5.21	[b]14.02	4.44	5.60	2.38	2.42	3.65	5.95	3.41	3.84
7	10.01	5.26	5.47	12.37	4.29	5.54	2.38	2.28	4.44	8.95	4.82	3.75
8	6.16	5.79	4.87	10.49	4.05	4.59	2.72	2.05	3.82	9.08	5.80	3.95
9	5.86	5.21	5.07	9.64	3.93	3.99	2.60	1.95	4.12	8.01	4.90	4.25
10	5.66	4.96	5.09	9.41	3.89	3.54	2.62	1.90	6.10	6.10	4.55	5.88
11	7.99	4.47	6.74	8.34	3.99	3.21	2.34	1.85	5.30	6.14	4.32	5.72
12	7.01	4.26	6.57	7.41	3.77	3.61	2.50	1.85	5.30	6.08	5.55	5.50
13	12.74	4.76	7.27	6.74	3.54	4.25	2.60	1.85	4.30	5.60	5.60	5.72
14	14.81	5.01	7.31	6.61	3.37	4.01	2.85	1.82	3.71	5.02	5.25	5.62
15	[c]15.76	8.76	6.58	8.37	3.24	3.69	2.90	1.85	14.05	8.40	5.05	7.61
16	11.86	8.31	6.19	7.64	3.15	3.34	2.45	1.90	15.80	8.38	5.02	10.15
15	8.95	7.13	5.49	6.91	3.09	3.13	2.30	1.90	10.55	7.40	4.72	[d]10.50
18	7.39	7.81	5.99	6.34	3.01	3.14	2.22	2.05	8.20	10.48	5.90	8.62
19	6.55	9.15	6.11	5.84	2.87	3.19	2.14	2.00	6.70	9.20	8.15	7.65
20	5.91	8.26	7.59	6.51	2.84	3.44	2.12	1.90	6.20	7.56	7.25	6.52
21	5.63	7.31	7.67	7.61	2.99	3.04	2.32	1.92	5.38	6.62	6.45	5.94
22	6.11	6.31	6.51	7.31	2.87	2.74	2.30	1.88	6.62	6.01	5.65	6.04
23	5.51	5.93	6.44	8.50	2.69	2.55	2.45	1.88	6.18	5.78	5.30	6.98
24	4.66	5.66	6.19	8.13	2.59	2.47	2.30	1.90	4.98	5.72	5.45	7.22
25	4.26	5.47	5.59	7.29	3.09	2.47	2.32	1.98	4.48	5.28	5.98	6.35
26	4.73	6.19	5.21	6.61	2.94	4.27	2.30	2.32	4.35	4.58	5.45	6.46
27	5.99	7.23	5.49	5.99	2.69	4.39	2.22	2.55	4.34	4.34	5.26	8.42
28	8.59	7.46	6.27	5.51	2.64	4.14	2.10	2.80	5.80	4.22	5.10	8.92
29	8.71	.....	5.64	5.23	2.54	4.42	2.05	4.15	6.05	4.05	5.18	7.18
30	13.69	.....	5.67	5.44	3.44	3.62	1.98	8.24	9.28	3.90	5.05	6.86
31	10.86	.....	6.14	.....	3.51	.....	1.95	6.68	.....	3.85	.....	8.02

[a] Maximum 11.35 feet at 11 a. m.; discharge 13,100 second-feet.
[b] Maximum 14.09 feet at 8.30 a. m.; discharge 20,500 second-feet.
[c] Maximum 15.91 feet at 9 a. m.; discharge 25,800 second-feet.
[d] Maximum 11.00 feet at 9 a. m.; discharge 12,200 second-feet.

NOTE.—No ice reported. Relation of gage height to discharge probably not affected by ice.

Daily discharge, in second-feet, of Kiskiminitas River at Avonmore, Pa., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6,440	7,130	4,260	3,610	3,070	921	765	170	5,350	5,870	1,360	1,940
2	7,520	5,740	3,740	3,170	3,760	700	592	163	2,940	12,400	1,320	1,920
3	10,300	4,590	3,230	3,310	3,400	622	514	248	1,230	7,740	1,160	1,870
4	8,650	4,290	2,930	3,570	2,590	547	445	232	1,160	5,990	1,030	1,770
5	5,290	4,350	2,500	7,470	2,170	542	382	236	893	5,000	935	1,470
6	9,110	3,570	2,710	20,300	1,860	3,180	363	382	1,160	3,620	977	1,310
7	10,100	2,770	3,020	15,700	1,710	3,110	363	317	1,860	8,090	2,260	1,240
8	3,900	3,420	2,320	11,100	1,500	2,010	536	220	1,300	8,320	3,430	1,400
9	3,510	2,710	2,540	9,360	1,390	1,440	470	182	1,560	6,520	2,350	1,680
10	3,250	2,420	2,570	8,920	1,350	1,070	481	163	3,820	3,820	1,970	3,530
11	6,480	1,890	4,650	7,050	1,440	837	344	146	2,820	3,870	1,740	3,330
12	5,010	1,680	4,430	5,580	1,260	1,130	420	146	2,820	3,790	3,120	3,060
13	16,700	2,200	5,380	4,650	1,070	1,680	470	146	1,720	3,180	3,180	3,330
14	22,500	2,470	5,440	4,480	949	1,460	610	135	1,210	2,480	2,760	3,200
15	25,300	7,760	4,440	7,100	858	1,190	640	146	20,400	7,150	2,520	5,880
16	14,400	7,000	3,940	5,930	798	928	396	163	25,400	7,120	2,480	10,400
17	8,090	5,180	3,050	4,870	758	784	326	163	11,200	5,570	2,150	11,100
18	5,560	6,200	3,680	4,130	706	791	291	220	6,820	11,000	3,560	7,520
19	4,400	8,450	3,830	3,480	622	824	257	200	4,600	8,540	6,740	5,940
20	3,570	6,920	5,860	4,350	604	998	248	163	3,950	5,810	5,350	4,370
21	3,220	5,440	5,980	5,880	694	726	335	170	2,920	4,500	4,280	3,610
22	3,830	4,090	4,350	5,440	622	547	326	156	4,500	3,700	3,240	3,740
23	3,070	3,600	4,260	7,320	520	445	396	156	3,920	3,400	2,820	4,970
24	2,090	3,250	3,940	6,710	465	406	326	163	2,440	3,330	3,000	5,310
25	1,680	3,020	3,170	5,410	758	406	335	193	1,900	2,800	3,660	4,140
26	2,160	3,940	2,710	4,480	664	1,690	326	335	1,770	2,000	3,000	4,290
27	3,680	5,320	3,050	3,680	520	1,810	291	445	1,760	1,760	2,770	7,180
28	7,470	5,660	4,040	3,070	492	1,580	240	580	3,430	1,650	2,580	8,040
29	7,680	.....	3,230	2,740	440	1,840	220	1,580	3,760	1,500	2,680	5,250
30	19,300	.....	3,260	2,990	998	1,140	193	6,880	8,680	1,360	2,520	4,810
31	11,900	.....	3,870	.....	1,050	.....	182	4,570	.....	1,320	.....	6,530

NOTE.—Daily discharge determined by means of a rating curve well defined throughout the range of stage during 1911. See footnotes to table of daily gage heights for crest discharges.

Monthly discharge of Kiskiminitas River at Avonmore, Pa., for 1911.

[Drainage area, 1,720 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	25,300	1,680	7,940	4.62	5.33	B.
February	8,450	1,680	4,470	2.60	2.71	A.
March	5,980	2,320	3,750	2.18	2.51	A.
April	20,300	2,740	6,200	3.60	4.02	A.
May	3,760	440	1,260	.733	.85	A.
June	3,180	406	1,180	.686	.77	A.
July	765	182	390	.227	.26	A.
August	6,880	135	618	.359	.41	A.
September	25,400	893	4,580	2.66	2.97	A.
October	12,400	1,320	4,940	2.87	3.31	A.
November	6,740	935	2,700	1.57	1.75	A.
December	11,100	1,240	4,330	2.52	2.91	A.
The year	25,400	135	3,520	2.05	27.80	

BLACKLICK CREEK AT BLACKLICK, PA.

Location.—At highway bridge about one-fourth mile from the railroad station at Blacklick, Pa., about 1 mile below the junction of Blacklick and Two Lick creeks and about 6 miles above the junction of Blacklick Creek with Conemaugh River.

Records available.—August 16, 1904, to July 15, 1906; January 8, 1907, to December 31, 1911.

Drainage area.—386 square miles. (Revised since last report.)

Gage.—Chain gage attached to bridge; datum unchanged since established.

Channel.—Fairly permanent.

Discharge measurements.—At high and medium stages made from the upstream side of the highway bridge; at low stages made by wading at a section just above the bridge. Extreme high-water measurements are made from the coal tipple one-fourth mile above the bridge, but no measurements have been made from it in the last few years.

Winter flow.—Ice may affect the relation of gage height to discharge for short periods during December, January, and February.

Accuracy.—No discharge measurements were made during 1911. On June 30, 1911, the gage was checked. On February 1, 1912 (previous to the preparation of this report), the gage was checked and a discharge measurement made. This discharge measurement checks the discharge rating table used for 1911. The records are believed to be accurate and reliable.

Cooperation.—Since January 8, 1907, station has been maintained by the Water Supply Commission of Pennsylvania, which supplied the gage heights for 1911.

Changes in rating curves necessitated by the reconstruction of the highway bridge have been discussed in Water-Supply Paper 263.

Daily gage height, in feet, of Blacklick Creek at Blacklick, Pa., for 1911.

[D. J. Walling, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.23	4.58	3.74	3.74	3.52	2.34	2.26	1.97	3.08	4.51	3.10	3.19
2	5.30	4.30	3.80	3.70	3.76	2.34	2.12	1.97	2.77	7.35	3.08	3.35
3	5.54	4.00	3.60	3.72	3.54	2.36	2.10	1.99	2.58	5.43	2.91	3.29
4	4.76	4.33	3.56	3.75	3.32	2.30	2.14	2.17	2.44	4.73	2.82	3.17
5	4.15	4.15	3.28	4.92	3.17	3.01	2.11	2.18	2.40	4.08	2.76	2.99
6	4.01	3.74	3.45	5.98	3.10	3.18	2.10	2.43	3.08	3.72	2.84	2.99
7	3.88	3.69	3.44	6.02	3.03	2.76	2.10	2.23	3.09	6.65	3.82	3.04
8	3.66	3.62	3.36	5.26	2.98	2.64	2.26	2.15	2.74	5.11	3.46	3.03
9	3.93	3.65	3.28	5.00	2.92	2.48	2.24	2.06	2.74	4.37	3.24	3.33
10	3.56	3.44	3.62	4.86	2.90	2.40	2.16	2.03	3.62	3.94	3.18	4.15
11	3.74	3.25	3.80	4.38	2.87	2.36	2.18	2.01	3.04	3.86	3.16	3.79
12	5.24	3.22	3.70	4.12	2.81	2.89	2.17	1.99	2.76	3.75	3.80	3.79
13	6.49	3.38	4.17	4.02	2.74	3.64	2.14	1.99	2.57	3.49	3.97	3.99
14	8.97	3.40	3.90	4.12	2.67	3.16	2.12	1.99	2.49	3.31	3.66	3.85
15	8.31	5.30	3.72	4.68	2.63	2.78	2.10	1.97	7.86	5.02	3.60	5.22
16	6.04	4.60	3.44	4.32	2.58	2.62	2.08	1.95	6.53	4.61	3.65	6.20
17	4.83	4.29	3.54	4.07	2.56	2.52	2.04	2.09	4.70	4.14	3.44	5.58
18	4.20	5.12	3.63	3.82	2.56	2.46	2.04	2.21	4.00	5.87	5.13	4.77
19	4.10	5.20	3.66	3.68	2.52	2.45	2.03	2.11	3.72	4.87	4.81	4.33
20	3.84	4.66	4.22	4.76	2.56	2.40	2.00	2.03	3.53	4.35	4.30	3.95
21	3.78	4.20	3.94	4.58	2.55	2.34	2.10	2.00	3.22	3.97	4.02	3.83
22	3.96	3.78	3.83	4.59	2.50	2.28	2.08	1.99	4.60	3.73	3.80	3.81
23	3.64	3.78	4.03	5.20	2.44	2.22	2.09	2.05	3.66	3.79	3.63	4.73
24	3.26	3.62	3.68	4.76	2.58	2.18	2.12	2.06	3.32	3.58	3.82	4.25
25	3.40	3.58	3.54	4.35	2.57	2.28	2.20	2.12	3.08	3.35	3.78	4.05
26	3.58	3.90	3.50	4.04	2.44	2.73	2.17	2.25	3.06	3.21	3.56	4.01
27	3.96	4.43	3.78	3.82	2.40	2.75	2.12	2.43	3.10	3.13	3.51	5.13
28	6.07	4.10	3.80	3.60	2.34	2.54	2.10	3.10	4.42	3.10	3.49	4.42
29	5.06	.....	3.61	3.46	2.30	2.46	2.08	3.26	5.00	3.00	3.59	3.93
30	6.50	.....	3.79	3.55	2.34	2.34	2.04	3.86	5.25	2.95	3.46	3.87
31	5.06	.....	3.88	.....	2.40	.....	2.00	3.19	.....	3.03	.....	4.82

NOTE.—No ice reported. Relation of gage height to discharge probably not affected by ice during 1911.

Daily discharge, in second-feet, of Blacklick Creek at Blacklick, Pa., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,230	1,500	760	760	604	94	73	17	356	1,430	365	410
2	2,320	1,230	805	730	775	94	42	17	230	5,880	356	498
3	2,640	965	660	745	618	99	38	20	166	2,490	284	464
4	1,690	1,260	632	768	481	83	46	53	122	1,650	248	400
5	1,100	1,100	459	1,860	400	324	40	55	110	1,030	226	316
6	974	760	558	3,300	365	405	38	119	356	745	256	316
7	869	723	551	3,360	334	226	38	66	360	4,480	821	338
8	702	674	503	2,270	312	185	73	48	219	2,080	564	334
9	909	695	459	1,950	288	134	69	31	219	1,290	437	486
10	632	551	674	1,800	280	110	51	26	674	917	405	1,100
11	760	442	805	1,300	268	99	55	23	338	853	395	798
12	2,240	426	730	1,070	244	276	53	20	226	768	805	798
13	4,180	514	1,110	982	219	688	46	20	162	584	941	957
14	9,500	525	885	1,070	195	395	42	20	137	476	702	845
15	7,980	2,320	745	1,600	182	233	38	17	6,980	1,970	660	2,220
16	3,400	1,520	551	1,250	166	179	35	14	4,260	1,530	695	3,670
17	1,760	1,220	618	1,020	159	146	28	36	1,620	1,090	551	2,690
18	1,140	2,090	681	821	159	128	28	61	965	3,120	2,110	1,700
19	1,050	2,190	702	716	146	125	26	40	745	1,810	1,740	1,260
20	837	1,580	1,160	1,690	159	110	21	26	611	1,280	1,230	925
21	790	1,140	917	1,500	156	94	38	21	426	941	982	829
22	933	790	829	1,510	140	78	35	20	1,520	752	805	813
23	688	790	990	2,190	122	64	36	30	702	798	681	1,650
24	448	674	716	1,690	166	55	42	31	481	646	821	1,180
25	525	646	618	1,280	162	78	59	42	356	498	790	1,010
26	646	885	590	999	122	216	53	71	347	420	632	974
27	933	1,350	790	821	110	222	42	119	365	380	597	2,110
28	3,450	1,050	805	660	94	153	38	365	1,340	365	584	1,340
29	2,020	.....	667	564	83	128	35	448	1,950	320	653	909
30	4,200	.....	798	625	94	94	28	853	2,260	300	564	861
31	2,020	.....	869	.....	110	.....	21	410	.....	334	.....	1,750

NOTE.—Daily discharge determined from a rating curve well defined below 1,320 second-feet (gage height 4.4 feet), poorly defined between 1,420 and 7,290 second-feet (gage heights 4.5 and 8 feet), and is an extension above 7,290 second-feet (gage height 8 feet).

Monthly discharge of Blacklick Creek at Blacklick, Pa., for 1911.

[Drainage area, 386 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	9,500	448	2,050	5.31	6.12	B.
February	2,320	426	1,060	2.75	2.86	A.
March	1,160	459	730	1.89	2.18	A.
April	3,360	564	1,360	3.52	3.93	A.
May	775	83	249	.645	.74	A.
June	688	55	177	.459	.51	A.
July	73	21	42.2	.109	.13	A.
August	853	14	101	.262	.30	A.
September	6,980	110	953	2.47	2.76	A.
October	5,880	300	1,330	3.45	3.98	A.
November	2,110	226	697	1.81	2.02	A.
December	3,670	316	1,100	2.85	3.29	A.
The year	9,500	14	819	2.12	28.82	

MONONGAHELA RIVER BASIN.

TYGART RIVER AT BELINGTON, W. VA.

Location.—At highway bridge at Belington, W. Va., one-fourth mile above the mouth of Mill Creek.

Records available.—June 5, 1907, to December 31, 1911.

Drainage area.—390 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged since established.

Channel.—Permanent.

Discharge measurements.—Made from upstream side of the bridge.

Floods.—The flood of January 30, 1911, reached a height of about 15.3 feet by the present gage datum.

Point of zero flow.—A determination by leveling, August 22, 1910, indicates that there would be no flow past the gage if the river stage were to fall to about 1.6 feet, referred to the gage datum.

Winter flow.—Ice may affect the relation of gage height to discharge for two or three weeks at a time during December, January, and February.

Discharge measurements of Tygart River at Belington, W. Va., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Jan. 17	C. T. Bailey	6.38	2,000
Feb. 1	.....do	6.43	2,080
Nov. 1	R. Perwien	3.14	227

Daily gage height, in feet, of Tygart River at Belington, W. Va., for 1911.

[S. A. Campbell, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.0	6.7	5.0	5.6	3.8	2.8	3.0	2.1	7.3	4.3	3.1	4.17
2	7.2	6.3	4.7	5.4	3.7	2.7	2.9	2.1	4.7	5.5	3.03	3.95
3	7.6	6.0	4.1	5.2	3.6	2.6	2.8	2.1	4.1	9.9	2.90	3.84
4	7.8	5.3	4.0	6.7	3.6	2.5	2.6	2.1	3.4	6.2	2.97	3.72
5	6.0	5.1	4.0	10.1	3.5	2.5	2.5	2.3	3.1	4.9	2.91	3.56
6	4.8	4.5	3.9	8.2	3.4	2.4	2.8	3.1	3.3	4.2	2.86	3.45
7	4.5	4.5	7.8	6.4	3.4	2.5	2.6	2.7	2.9	4.1	8.21	3.40
8	4.2	4.4	6.3	6.4	3.3	4.2	3.6	2.5	2.9	12.3	6.50	3.40
9	3.8	4.4	6.0	6.6	3.3	3.6	3.4	2.5	2.9	8.4	5.00	3.40
10	3.9	4.9	6.0	7.2	3.3	3.2	3.3	2.6	2.9	5.2	4.35	3.43
11	3.7	4.5	6.3	5.7	3.2	3.2	3.0	2.5	3.0	5.4	3.93	3.47
12	4.6	4.2	6.3	5.2	3.1	3.8	4.0	2.4	4.4	7.0	3.82	3.39
13	7.0	4.0	6.6	4.4	3.0	3.0	3.5	2.3	5.0	5.7	3.70	3.45
14	10.8	3.8	6.7	4.1	3.0	3.5	3.0	2.2	4.2	4.9	3.84	3.47
15	7.2	3.8	6.6	6.4	2.9	3.2	2.8	2.5	4.2	6.2	3.80	3.50
16	9.0	3.7	6.1	6.0	2.8	3.0	2.6	2.5	12.1	7.0	3.90	4.26
17	7.4	3.5	5.2	5.4	2.8	2.9	2.6	2.5	11.7	5.6	3.97	4.84
18	5.2	3.4	4.9	4.8	2.8	5.8	2.5	2.3	6.1	9.0	4.21	5.16
19	4.6	3.4	5.2	4.4	2.8	5.3	2.4	2.2	4.6	9.4	4.62	4.50
20	4.2	4.1	6.6	4.7	3.3	3.7	2.3	2.2	4.1	6.1	5.44	4.09
21	4.1	4.8	6.5	7.0	3.2	3.6	2.4	2.2	3.7	5.0	4.63	3.98
22	7.2	4.4	6.3	7.2	3.0	3.3	2.4	2.0	4.2	4.7	4.21	3.82
23	6.9	4.0	5.0	6.8	2.8	3.0	2.4	2.0	4.7	4.2	3.97	3.95
24	5.5	3.9	4.9	6.4	2.8	2.8	2.4	2.0	4.2	4.3	3.76	4.28
25	5.0	4.0	4.6	5.8	2.6	4.2	2.3	2.0	3.6	4.0	4.05	5.35
26	4.9	4.4	4.4	5.1	2.6	3.8	2.2	2.0	3.5	3.3	4.13	4.99
27	10.2	4.8	4.0	4.6	2.6	3.8	2.2	1.9	3.2	3.5	4.20	7.54
28	8.8	5.4	4.1	4.2	2.9	3.6	2.3	2.5	4.6	3.6	4.19	6.65
29	8.7	.....	4.0	4.0	2.7	3.2	2.1	2.9	4.2	3.4	4.40	5.40
30	13.7	.....	4.5	3.9	2.7	3.1	2.1	4.0	4.4	3.1	4.40	4.79
31	14.7	.....	6.4	.....	3.0	.....	2.2	10.2	.....	3.2	.....	6.32

NOTE.—No ice reported by observer. Relation of gage height to discharge probably not affected by ice during 1911.

Daily discharge, in second-feet, of Tygart River at Belington, W. Va., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,540	2,300	1,130	1,500	498	132	183	26	2,790	745	213	679
2	2,700	2,000	959	1,370	452	110	156	26	959	1,440	192	571
3	3,050	1,780	644	1,250	407	90	132	26	644	5,390	156	517
4	3,230	1,310	595	2,300	407	73	90	26	321	1,920	175	461
5	1,780	1,190	595	5,610	363	73	73	47	213	1,070	159	389
6	1,020	850	546	3,620	321	59	132	213	282	694	146	342
7	850	850	3,230	2,070	321	73	90	110	156	644	3,630	321
8	694	797	2,000	2,070	282	694	407	73	156	8,190	2,150	321
9	498	797	1,780	2,230	282	407	321	73	156	3,810	1,130	321
10	546	1,070	1,780	2,700	282	246	282	90	156	1,250	771	334
11	452	850	2,000	1,560	246	246	183	73	183	1,370	561	350
12	904	694	2,000	1,250	213	498	595	59	797	2,540	508	317
13	2,540	595	2,230	797	183	183	363	47	1,130	1,566	452	342
14	6,410	498	2,300	644	183	363	183	36	694	1,070	517	350
15	2,700	498	2,230	2,070	156	246	132	73	694	1,920	498	363
16	4,410	452	1,850	1,780	132	183	90	73	7,950	2,540	546	725
17	2,870	363	1,250	1,370	132	156	90	73	7,470	1,500	580	1,040
18	1,250	321	1,070	1,020	132	1,630	73	47	1,850	4,410	699	1,220
19	904	321	1,250	797	132	1,310	59	36	904	4,840	915	850
20	694	644	2,230	959	282	452	47	36	644	1,850	1,400	639
21	644	1,020	2,150	2,540	246	407	59	36	452	1,130	920	585
22	2,700	797	2,000	2,700	183	282	59	18	694	959	699	508
23	2,460	595	1,130	2,380	132	183	59	18	959	694	580	571
24	1,440	546	1,070	2,070	132	132	59	18	694	745	480	735
25	1,130	595	904	1,630	90	694	47	18	407	595	620	1,340
26	1,070	797	797	1,190	90	498	36	18	363	282	659	1,120
27	5,720	1,020	595	904	90	498	36	12	246	363	694	3,000
28	4,210	1,370	644	694	156	407	47	73	904	407	689	2,260
29	4,110	.....	595	595	110	246	26	156	694	321	797	1,370
30	9,920	.....	850	546	110	213	26	595	797	213	797	1,010
31	11,200	.....	2,070	.....	183	.....	36	5,720	.....	246	.....	2,010

NOTE.—Daily discharge determined from a discharge rating curve well defined between 73 and 2,540 second-feet (gage heights, 2.5 and 7.0 feet).

Monthly discharge of Tygart River at Belington, W. Va., for 1911.

[Drainage area, 390 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	11,200	452	2,730	7.00	8.07	B.
February	2,300	321	890	2.28	2.37	A.
March	3,230	546	1,430	3.67	4.23	A.
April	5,610	546	1,740	4.46	4.98	A.
May	498	90	223	.572	.66	A.
June	1,630	59	359	.921	1.03	A.
July	595	26	135	.346	.40	A.
August	5,720	12	256	.656	.76	B.
September	7,950	156	1,150	2.95	3.29	B.
October	8,190	213	1,760	4.51	5.20	B.
November	3,630	146	744	1.91	2.13	A.
December	3,000	317	805	2.06	2.38	A.
The year	11,200	12	1,020	2.62	35.50	

TYGART RIVER AT FETTERMAN, W. VA.

Location.—At highway bridge at Fetterman, W. Va., three-fourths mile above mouth of Otter Creek.

Records available.—June 3, 1907, to December 31, 1911.

Drainage area.—1,340 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged since established.

Channel.—Permanent; broken by one pier. Current low at low stages.

Discharge measurements.—Made from downstream side of bridge.

Floods.—No records of floods previous to installation of gage are available. Maximum gage height since installation of gage was 21.5 feet January 30, 1911.

Point of zero flow.—A determination by leveling, August 20, 1910, indicates that there would be no flow past the gage if the river stage were to fall to 1.65 feet, ±0.1 foot, referred to the gage datum.

Winter flow.—Ice may affect the relation of gage height to discharge for two or three weeks at a time during December, January, and February.

Discharge measurements of Tygart River at Fetterman, W. Va., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 16	C. T. Bailey	10.92	12,600	Jan. 31	C. T. Bailey	15.39	22,900
16	do	10.70	12,400	Oct. 30	R. Perwien	4.37	866
18	do	6.56	4,620				

Daily gage height, in feet, of Tygart River at Fetterman, W. Va., for 1911.

[Joseph Gerkin, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.1	9.5	5.6	6.65	4.85	3.5	3.85	3.0	9.25	6.05	4.20	5.36
2	7.35	7.0	5.35	6.4	4.75	3.5	3.75	3.0	7.0	9.05	4.05	5.15
3	8.55	6.5	5.25	6.1	4.55	3.5	3.7	3.0	5.0	11.65	4.00	4.96
4	8.75	6.25	5.1	7.85	4.5	3.5	3.65	3.0	4.8	7.60	3.95	4.85
5	7.2	5.95	4.85	11.6	4.35	3.45	3.5	3.0	4.35	6.55	3.90	4.70
6	6.15	5.45	4.75	9.75	4.3	3.4	3.45	2.95	4.15	5.95	4.00	4.56
7	5.4	5.5	6.75	8.05	4.3	4.2	3.5	2.9	4.1	9.45	6.55	4.50
8	5.15	5.5	7.6	7.7	4.25	4.05	3.9	3.35	4.05	14.70	7.05	4.40
9	5.4	5.7	7.45	8.75	4.15	3.95	3.6	3.5	4.0	10.30	5.85	4.37
10	4.85	6.0	7.1	8.8	4.1	4.15	3.95	3.4	4.0	8.00	5.32	4.36
11	4.7	5.7	6.85	7.8	4.05	3.9	3.9	3.35	4.25	7.40	5.10	4.44
12	4.85	5.35	6.65	6.65	4.0	4.05	3.75	3.25	4.7	7.80	4.75	4.50
13	11.5	5.15	6.3	5.65	3.9	3.95	3.9	3.2	5.8	6.90	5.01	4.51
14	14.8	4.95	6.3	5.45	3.9	4.35	3.95	3.2	5.4	5.85	4.98	4.70
15	10.5	4.9	6.5	7.65	3.85	4.65	3.75	3.2	5.95	6.05	4.90	5.40
16	10.75	4.85	6.3	7.7	3.75	4.6	3.55	3.2	14.55	7.05	4.80	7.40
17	8.15	4.55	5.85	6.55	3.65	4.3	3.45	3.2	15.05	7.70	4.80	8.18
18	6.45	4.45	5.65	5.85	3.55	5.5	3.4	3.15	9.2	11.10	6.00	6.92
19	5.55	4.3	6.3	5.55	3.5	6.5	3.35	3.1	6.5	10.70	6.58	6.02
20	5.3	5.5	7.4	5.65	3.45	5.9	3.3	3.1	5.5	7.85	6.28	5.32
21	5.2	6.1	7.2	6.8	3.75	5.5	3.25	3.05	5.2	6.25	5.71	5.15
22	6.15	5.85	6.75	7.4	3.95	4.75	3.2	3.0	5.9	5.45	5.31	5.02
23	7.65	5.25	6.2	7.85	3.85	4.25	3.2	3.0	6.0	5.10	5.02	5.20
24	6.95	5.2	5.7	7.5	3.65	4.15	3.2	2.95	5.25	4.95	4.91	5.78
25	6.1	5.2	5.3	6.9	3.55	4.1	3.3	2.9	4.95	5.05	5.26	6.26
26	6.15	5.25	5.15	6.15	3.5	4.75	3.3	3.0	4.85	4.90	5.48	6.18
27	11.4	5.4	5.05	5.7	3.5	5.0	3.25	3.15	4.7	4.75	5.45	9.98
28	10.7	5.65	4.95	5.3	3.6	4.95	3.15	3.35	4.55	4.60	5.40	8.46
29	10.3	.....	4.95	5.1	3.6	4.5	3.05	5.15	5.35	4.55	5.48	7.41
30	20.35	.....	5.2	4.9	3.55	4.1	3.0	6.65	5.3	4.35	5.52	6.16
31	15.95	.....	6.4	.....	3.5	.....	3.0	10.1	.....	4.30	.....	6.68

NOTE.—No ice reported by observer. Relation of gage height to discharge probably not affected by ice during 1911.

Daily discharge, in second-feet, of Tygart River at Fetterman, W. Va., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5,550	10,000	2,850	4,730	1,570	218	418	63	9,580	3,650	699	2,440
2	6,010	5,370	2,420	4,280	1,400	218	354	63	5,370	9,200	566	2,080
3	8,250	4,460	2,250	3,740	1,110	218	323	63	1,820	14,300	525	1,750
4	8,630	4,010	1,990	6,940	1,040	218	296	63	1,480	6,480	488	1,570
5	5,740	3,470	1,670	14,200	859	195	218	63	859	4,550	451	1,320
6	3,830	2,590	1,400	10,500	802	172	195	56	653	3,470	525	1,120
7	2,510	2,680	4,910	7,310	802	699	218	50	607	9,960	4,550	1,040
8	2,080	2,680	6,480	6,660	750	566	451	153	566	21,200	5,460	916
9	2,510	3,030	6,200	8,630	653	488	268	218	525	11,600	3,290	882
10	1,570	3,560	5,550	8,720	607	653	488	172	525	7,220	2,370	871
11	1,320	3,030	5,090	6,850	566	451	451	153	750	6,110	1,990	966
12	1,570	2,420	4,730	4,750	525	566	354	118	1,320	6,850	1,400	1,040
13	14,000	2,080	4,100	2,940	451	488	451	103	3,210	5,190	1,840	1,050
14	21,400	1,740	4,100	2,590	451	859	488	103	2,510	3,290	1,790	1,320
15	12,000	1,650	4,460	6,570	418	1,250	354	103	3,470	3,650	1,650	2,510
16	12,400	1,570	4,100	6,660	354	1,180	243	103	20,900	5,460	1,480	6,110
17	7,500	1,110	3,290	4,550	296	802	195	103	22,000	6,660	1,480	7,550
18	4,370	978	2,940	3,290	243	2,680	172	92	9,480	13,100	3,560	5,220
19	2,770	802	4,100	2,770	218	4,460	153	80	4,460	12,300	4,600	3,600
20	2,330	2,680	6,110	2,940	195	3,380	134	80	2,680	6,940	4,060	2,370
21	2,160	3,740	5,740	5,000	354	2,680	118	72	2,160	4,010	3,050	2,080
22	3,830	3,290	4,910	6,110	488	1,400	103	63	3,380	2,590	2,350	1,850
23	6,570	2,250	3,920	6,940	418	750	103	63	3,560	1,990	1,850	2,160
24	5,280	2,160	3,030	6,290	296	653	103	56	2,250	1,740	1,670	3,170
25	3,740	2,160	2,330	5,190	243	607	134	50	1,740	1,900	2,270	4,020
26	3,830	2,250	2,080	3,830	218	1,400	134	63	1,570	1,650	2,650	3,880
27	13,800	2,510	1,900	3,030	218	1,820	118	92	1,320	1,400	2,590	11,000
28	12,300	2,940	1,740	2,330	268	1,740	92	153	1,110	1,180	2,510	8,080
29	11,600	.....	1,740	1,990	268	1,040	72	2,080	2,420	1,110	2,650	6,130
30	35,000	.....	2,160	1,650	243	607	63	4,730	2,340	859	2,710	3,840
31	24,200	.....	4,280	.....	218	.....	63	11,200	.....	802	.....	4,780

NOTE.—Daily discharge determined from a rating curve well defined between 63 and 24,300 second-feet (gage heights 3.0 and 16.0 feet).

Monthly discharge of Tygart River at Fetterman, W. Va., for 1911.

[Drainage area, 1,340 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	35,000	1,320	8,020	5.99	6.91	A.
February	10,000	802	2,900	2.16	2.25	A.
March	6,480	1,400	3,630	2.71	3.12	A.
April	14,200	1,650	5,400	4.03	4.50	A.
May	1,570	195	534	.399	.46	A.
June	4,460	172	1,080	.806	.90	A.
July	488	63	236	.176	.20	A.
August	11,200	50	859	.641	.74	A.
September	22,000	525	3,820	2.85	3.18	A.
October	21,200	802	5,820	4.34	5.00	A.
November	5,460	451	2,240	1.67	1.86	A.
December	11,000	871	3,120	2.33	2.69	A.
The year	35,000	50	3,140	2.34	31.81	

WEST FORK RIVER AT ENTERPRISE, W. VA.

Location.—At the highway bridge at Enterprise, W. Va., three-fourths mile above the mouth of Bingamon Creek.

Records available.—June 2, 1907, to December 31, 1911.

Drainage area.—750 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged since established.

Channel.—Permanent; broken by one pier; smooth, rock bottom.

Discharge measurements.—Made from downstream side of bridge.

Floods.—No record of floods previous to establishment of gage is available. Maximum gage height since recorded is 17.6 feet, January 30, 1911.

Point of zero flow.—A determination by leveling August 17, 1910, indicates that there would be no flow past the gage if the river stage were to fall to 0.1 foot, ±0.1 foot, referred to the gage datum.

Winter flow.—Ice may affect the relation of gage height to discharge for two or three weeks at a time during December, January, and February.

Accuracy.—The gage reader stated that during the summer of 1908 the only water running in the river was pumpage from numerous coal mines along the stream; otherwise the records are good.

Discharge measurements of West Fork River at Enterprise, W. Va., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*			*Feet.*	*Sec.-feet.*
Jan. 15	C. T. Bailey	7.67	4,920	Feb. 2	C. T. Bailey	4.52	1,750
18	do	3.91	1,320	Oct. 28	R. Perwien	2.26	333

Daily gage height, in feet, of West Fork River at Enterprise, W. Va., for 1911.

[C. M. Tetrick, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.0	5.2	3.1	5.1	2.5	1.3	1.6	0.9	7.5	4.0	2.00	3.00
2	5.6	4.4	2.9	4.5	2.7	1.3	1.6	.9	4.3	4.8	1.90	3.90
3	5.0	3.9	2.7	4.1	2.5	1.2	1.5	.8	3.2	9.3	1.82	2.80
4	6.7	5.3	2.5	5.4	2.4	1.7	1.8	.8	2.4	5.5	1.80	2.60
5	4.9	4.8	2.4	10.5	2.2	1.6	1.7	.8	2.3	3.8	1.76	2.40
6	4.7	4.0	2.5	7.5	2.1	1.5	1.6	.9	2.1	3.5	1.90	2.30
7	3.3	4.1	3.3	6.3	2.0	1.3	1.5	1.0	2.7	8.1	5.50	2.20
8	3.0	4.0	6.0	5.7	2.0	1.3	1.8	1.0	2.5	13.1	5.18	2.17
9	4.0	3.8	8.2	7.5	1.8	1.3	1.7	1.0	2.3	7.2	3.65	2.05
10	3.4	3.8	5.6	6.9	1.8	1.2	1.6	.9	2.6	4.4	3.04	1.90
11	3.2	3.4	4.4	4.9	1.8	1.2	1.4	.9	2.7	4.6	2.70	1.90
12	3.0	3.1	3.7	3.9	1.7	1.4	1.3	.8	4.8	5.9	2.56	2.19
13	9.8	2.9	3.4	3.8	1.7	1.3	1.2	.8	3.5	4.2	2.32	2.00
14	12.7	2.8	4.5	3.7	1.6	1.2	1.2	.8	2.8	3.5	5.10	2.00
15	7.6	2.7	4.2	9.1	1.6	1.1	1.1	.9	5.0	3.8	4.00	5.05
16	8.0	2.5	3.9	7.0	1.5	1.0	1.1	.8	10.3	4.2	3.20	7.35
17	5.0	2.3	3.3	4.6	1.5	1.0	1.0	.8	11.0	9.6	2.90	8.24
18	4.1	2.3	3.1	4.1	1.5	1.2	1.0	2.0	6.1	7.1	4.51	6.20
19	3.5	2.2	3.8	4.7	1.4	3.3	1.0	1.5	3.5	6.8	4.80	5.10
20	3.0	3.7	4.6	5.6	1.4	3.0	1.0	1.2	3.3	4.8	4.40	4.20
21	3.0	4.7	5.0	4.9	1.4	2.4	.9	1.1	2.9	3.7	3.60	4.00
22	7.0	5.8	3.9	4.5	1.7	2.2	.9	1.1	7.5	3.3	3.00	3.72
23	5.9	4.4	3.5	4.1	1.6	1.9	.9	1.1	5.5	3.0	2.70	3.50
24	4.4	3.9	3.2	4.5	1.6	1.7	1.0	1.1	3.2	3.0	2.51	3.20
25	3.8	3.5	2.8	4.0	1.6	1.6	1.0	1.2	2.5	2.9	3.80	5.62
26	4.2	3.9	2.6	3.4	1.6	1.9	.9	1.6	2.5	2.6	3.71	4.86
27	7.6	3.8	2.5	3.0	1.5	1.8	.8	1.8	2.3	2.4	3.62	10.82
28	8.3	3.5	2.5	2.9	1.4	1.7	.8	1.5	2.0	2.27	3.40	6.72
29	5.8	.....	2.5	2.8	1.3	1.8	.8	1.9	4.0	2.21	3.21	4.61
30	17.6	.....	2.4	2.7	1.3	1.7	.8	7.7	3.5	2.04	3.10	5.42
31	9.7	.....	5.7	.....	1.3	.....	.8	10.7	.....	2.02	.....	4.22

NOTE.—No ice reported. Relation of gage height to discharge probably not affected by ice during 1911.

Daily discharge, in second-feet, of West Fork River at Enterprise, W. Va., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3,150	2,360	767	2,270	441	52	99	25	4,740	1,380	227	707
2	2,750	1,680	649	1,760	540	52	99	25	1,600	2,010	190	1,300
3	2,180	1,300	540	1,450	441	43	79	20	829	6,820	162	593
4	3,880	2,460	441	2,550	395	124	155	20	395	2,650	155	489
5	2,090	2,010	395	8,280	307	99	124	20	350	1,230	143	395
6	1,920	1,380	441	4,740	266	79	99	25	266	1,030	190	350
7	893	1,450	893	3,460	227	52	79	30	540	5,400	2,650	307
8	707	1,380	3,150	2,850	227	52	155	30	441	11,600	2,340	295
9	1,380	1,230	5,510	4,740	155	52	124	30	350	4,420	1,130	246
10	959	1,230	2,750	4,090	155	43	99	25	489	1,680	731	190
11	829	959	1,680	2,090	155	43	64	25	540	1,840	540	190
12	707	767	1,160	1,300	124	64	52	20	2,010	3,050	470	303
13	7,430	649	959	1,230	124	52	43	20	1,030	1,530	359	227
14	11,100	593	1,760	1,160	99	43	43	20	593	1,030	2,270	227
15	4,850	540	1,530	6,580	99	36	36	25	2,180	1,230	1,380	2,220
16	5,290	441	1,300	4,200	79	30	36	20	8,040	1,530	829	4,580
17	2,180	350	893	1,840	79	30	30	20	8,900	7,180	649	5,560
18	1,450	350	767	1,450	79	43	30	227	3,250	4,310	1,770	3,360
19	1,030	307	1,230	1,920	64	893	30	79	1,030	3,990	2,010	2,270
20	707	1,160	1,840	2,750	64	707	30	43	893	2,010	1,680	1,530
21	707	1,920	2,180	2,090	64	395	25	36	649	1,160	1,090	1,380
22	4,200	2,950	1,300	1,760	124	307	25	36	4,740	893	707	1,180
23	3,050	1,680	1,030	1,450	99	190	25	36	2,650	707	540	1,030
24	1,680	1,300	829	1,760	99	124	30	36	829	707	446	829
25	1,230	1,030	593	1,380	99	99	30	43	441	649	1,230	2,770
26	1,530	1,300	489	959	99	190	25	99	441	489	1,170	2,060
27	4,850	1,230	441	707	79	155	20	155	350	395	1,110	8,680
28	5,620	1,030	441	649	64	124	20	79	227	337	959	3,900
29	2,950	.....	441	593	52	155	20	190	1,380	311	835	1,850
30	17,700	.....	395	540	52	124	20	4,960	1,030	243	767	2,570
31	7,300	.....	2,850	.....	52	.....	20	8,530	.....	235	.....	1,540

NOTE.—Daily discharge determined from a rating curve that is well defined between 0 and 2,180 second-feet (gage heights 0.0 and 5.0 feet) and fairly well defined between 2,270 and 6,460 second-feet (gage heights 5.1 and 9.0 feet).

Monthly discharge of West Fork River at Enterprise, W. Va., for 1911.

[Drainage area, 750 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	17,700	707	3,430	4.57	5.27	B.
February	2,950	307	1,250	1.67	1.74	A.
March	5,510	395	1,280	1.71	1.97	A.
April	8,280	540	2,420	3.23	3.60	A.
May	540	52	161	.215	.25	B.
June	893	30	148	.197	.22	B.
July	155	20	57.0	.076	.09	B.
August	8,530	20	482	.643	.74	B.
September	8,900	227	1,710	2.28	2.54	A.
October	11,600	235	2,320	3.09	3.56	A.
November	2,650	143	958	1.28	1.43	A.
December	8,680	190	1,710	2.28	2.63	A.
The year	17,700	20	1,330	1.77	24.04	

CHEAT RIVER NEAR MORGANTOWN, W. VA.

Location.—At highway bridge at Uneva, W. Va., 10 miles above mouth of river. Parallel of latitude 39° 40′ crosses the river at this bridge.

Records available.—July 8 to December 30, 1899; July 1 to December 29, 1900; August 21, 1902, to December 31, 1905; November 18, 1908, to December 31, 1911.

Drainage area.—1,380 square miles.

Gage.—Standard chain gage attached to bridge. See history of this station in Water-Supply Papers 263 and 283.

Channel.—Probably permanent.

Discharge measurements.—Made from upstream side of bridge or by wading at low water.

Winter flow.—Ice forms sometimes to a thickness of several inches, and large ice jams may affect the relation of gage height to discharge during short periods in December, January, and February.

Accuracy.—This station has not been inspected by United States Geological Engineers during 1910 and 1911. Gage heights since January, 1909, are considered excellent. Discharge measurements made during 1912 and January 1913 (prior to the preparation of this report) by H. P. Drake, an engineer of the Pittsburgh Hydro-Electro Co., indicate that a revision of the rating curve used from 1902 to 1911 is necessary. This indicated change begins at gage-height 4.6 feet and is about +24 per cent at gage height 13.0 feet. Discharge estimates above 5,000 second-feet during 1902–1911 should therefore be used with caution.

Cooperation.—The gage reader's salary is paid by F. W. Scheidenhelm.

The following discharge measurement was made by H. P. Drake, an engineer of the Pittsburg Hydro-Electric Co.:

October 7, 1911: Gage height, 4.79 feet; discharge, 6,220 second-feet.

Daily gage height, in feet, of Cheat River near Morgantown, W. Va., for 1911.

[C. F. Baker, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.97	5.68	4.41	4.07	3.77	2.96	3.09	2.09	7.02	4.33	3.13	3.92
2	5.87	5.08	4.07	3.87	3.98	3.22	2.93	2.03	5.12	6.50	3.02	3.66
3	6.79	4.74	3.81	4.06	3.81	3.03	2.77	2.05	4.16	7.34	3.00	3.60
4	6.63	4.70	3.65	4.51	3.62	2.82	2.69	2.09	3.63	5.61	2.92	3.52
5	5.24	4.59	3.49	8.82	3.45	2.69	2.59	2.47	3.40	4.78	2.86	3.34
6	4.46	4.40	3.77	8.13	3.32	2.70	2.55	2.35	3.32	4.34	2.92	3.20
7	4.09	4.16	5.48	6.49	3.18	5.34	2.80	2.38	3.33	5.04	4.10	3.17
8	3.82	4.02	4.77	5.77	3.18	4.92	3.05	2.39	3.16	8.45	4.98	3.21
9	3.83	4.35	4.55	6.11	3.10	3.96	2.95	2.33	3.20	5.98	4.32	3.26
10	3.56	4.42	4.96	5.79	3.06	3.52	3.25	2.34	3.52	4.94	3.96	3.36
11	3.36	4.06	5.77	5.01	2.98	3.24	3.01	2.21	3.32	4.92	3.70	3.74
12	3.82	3.83	5.09	4.58	2.92	3.63	2.96	2.12	3.49	5.48	3.58	3.92
13	10.40	3.76	5.03	4.22	2.86	3.59	3.59	2.18	3.76	4.92	3.60	3.40
14	9.02	3.70	5.75	4.10	2.77	3.79	3.09	.....	3.50	4.48	3.56	3.35
15	7.28	3.93	5.00	5.51	2.74	3.59	2.79	2.52	4.82	4.49	3.50	4.35
16	7.20	3.88	4.69	5.38	2.66	3.35	2.59	3.02	7.79	5.45	3.50	5.30
17	5.60	3.73	4.27	4.52	2.64	3.02	2.50	2.52	7.12	4.92	3.46	5.81
18	4.82	3.63	4.34	4.47	2.56	5.27	2.41	2.30	5.32	7.23	4.18	4.86
19	4.18	3.69	4.35	4.24	2.56	6.13	2.37	2.38	4.44	6.42	5.16	4.40
20	3.99	3.89	5.97	4.53	2.56	4.59	2.33	2.24	4.46	5.26	4.70	3.92
21	3.86	3.99	5.27	5.38	2.66	3.97	2.33	2.14	4.06	4.62	4.12	3.78
22	4.38	3.77	4.74	5.27	2.78	3.63	2.31	2.06	4.15	4.24	3.92	3.86
23	4.93	3.61	4.45	5.88	2.68	3.29	2.35	2.03	4.35	4.22	3.70	4.08
24	4.36	3.54	4.41	5.38	2.68	3.11	2.37	2.04	3.86	4.19	3.61	5.26
25	4.10	3.45	3.99	4.88	2.72	3.08	2.33	.....	3.54	3.94	3.94	4.70
26	4.35	3.89	3.83	4.47	2.72	4.19	2.32	2.72	3.42	3.72	3.92	4.63
27	6.34	4.41	3.72	4.17	2.70	4.73	2.26	2.60	3.33	3.58	3.82	7.36
28	7.00	4.83	3.82	3.92	3.86	4.23	2.22	2.76	3.54	3.45	3.84	5.76
29	6.67	.....	3.83	3.81	3.27	3.68	2.21	5.65	4.83	3.34	4.02	4.89
30	13.59	.....	3.81	3.78	3.10	3.34	2.14	6.69	4.93	3.28	4.16	4.51
31	7.63	.....	4.23	.....	2.98	.....	2.13	8.82	.....	3.20	.....	5.48

NOTE.—Relation of gage height to discharge probably not affected by ice. No notes made by observer relative to ice.

Daily discharge, in second-feet, of Cheat River near Morgantown, W. Va., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6,490	9,180	4,290	3,300	2,450	860	1,040	290	14,300	3,950	1,120	2,710
2	9,960	6,870	3,300	2,710	3,000	1,180	860	272	6,870	12,300	915	2,200
3	13,500	5,370	2,450	3,300	2,450	980	668	272	3,620	15,500	915	1,960
4	12,700	5,370	1,960	4,640	1,960	710	625	290	1,960	8,790	805	1,730
5	7,250	5,000	1,730	21,600	1,620	625	545	452	1,520	5,740	758	1,430
6	4,640	4.290	2,450	18,700	1,340	625	512	400	1,340	3,950	805	1,180
7	3,300	3,620	8,400	12,300	1,180	7,630	710	425	1,430	6,490	3,300	1,180
8	2,450	3,000	5,740	9,570	1,180	6,110	980	425	1,120	19,900	6,490	1,180
9	2,450	4,290	5,000	10,700	1,040	3,000	860	400	1,180	10,400	3,950	1,260
10	1,960	4,290	6,490	9,570	980	1,730	1,260	400	1,730	6,110	3,000	1,430
11	1,430	3,300	9,570	6,490	915	1,260	915	330	1,340	6,110	2,200	2,200
12	2,450	2,450	6,870	5,000	805	1,960	860	290	1,730	8,400	1,960	2,710
13	28,000	2,450	6,490	3,620	758	1,960	1,960	330	2,450	6,110	1,960	1,520
14	22,400	2,200	9,570	3,300	668	2,450	1,040	[a] 405	1,730	4,640	1,960	1,430
15	15,500	2,710	6,490	8,400	668	1,960	710	480	5,740	4,640	1,730	4,290
16	15,100	2,710	5,370	8,010	585	1,430	545	915	17,500	8,010	1,730	7,630
17	8,790	2,200	3,950	4,640	585	915	480	480	14,700	6,110	1,620	9,570
18	5,740	1,960	3,950	4,640	512	7,630	425	375	7,630	15,100	3,620	6,110
19	3,620	2,200	4,290	3,620	512	10,700	400	425	4,290	11,900	7,250	4,290
20	3,000	2,710	10,400	4,640	512	5,000	400	352	4,640	7,630	5,370	2,710
21	2,710	3,000	7,630	8,010	585	3,000	400	310	3,300	5,000	3,300	2,450
22	4,290	2,450	5,370	7,630	710	1,960	375	272	3,620	3,620	2,710	2,710
23	6,110	1,960	4,290	9,960	625	1,340	400	272	4,290	3,620	2,200	3,300
24	4,290	1,730	4,290	8,010	625	1,040	400	272	2,710	3,620	1,960	7,630
25	3,300	1,620	3,000	6,110	625	1,040	400	[a] 448	1,730	2,710	2,710	5,370
26	4,290	2,710	2,450	4,640	625	3,620	375	625	1,520	2,200	2,710	5,000
27	11,500	4,290	2,200	3,620	625	5,370	352	545	1,430	1,960	2,450	15,900
28	14,300	5,740	2,450	2,710	2,710	3,620	330	668	1,730	1,620	2,450	9,570
29	13,100	.....	2,450	2,450	1,260	2,200	330	8,790	5,740	1,430	3,000	6,110
30	41,200	.....	2,450	2,450	1,040	1,430	310	13,100	6,110	1,340	3,620	4,640
31	16,700	.....	3,620	.....	915	.....	310	21,600	.....	1,180	.....	8,400

[a] Aug. 14 and 25, daily discharge interpolated.

NOTE.—Daily discharge determined from a rating curve well defined between 115 and 12,300 second-feet (gage heights 1.5 and 6.5 feet).

Monthly discharge of Cheat River near Morgantown, W. Va., for 1911.

[Drainage area, 1,380 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	41,200	1,430	9,440	6.84	7.89	C.
February	9,180	1,620	3,560	2.58	2.69	B.
March	10,400	1,730	4,810	3.49	4.02	A.
April	21,600	2,450	6,810	4.93	5.50	A.
May	3,000	512	1,100	.797	.92	A.
June	10,700	625	2,780	2.01	2.24	A.
July	1,960	310	638	.462	.53	A.
August	21,600	272	1,770	1.28	1.48	A.
September	17,500	1,120	4,300	3.12	3.48	A.
October	19,900	1,180	6,450	4.67	5.38	B.
November	7,250	758	2,620	1.90	2.12	A.
December	15,900	1,180	4,190	3.04	3.50	A.
The year	41,200	272	4,040	2.93	39.75	

YOUGHIOGHENY RIVER AT CONFLUENCE, PA.

Location.—At highway bridge about half a mile from the railroad station at Confluence, Pa., and about half a mile above the mouth of Casselman River.

Records available.—September 15, 1904, to December 31, 1911.

Drainage area.—435 square miles.

Gage.—Chain gage attached to bridge; datum unchanged since established.

Channel.—Probably permanent.

Discharge measurements.—Made from upstream side of bridge.

Winter flow.—Relation of gage height to discharge is occasionally affected by ice.

Accuracy.—The discharge measurement made July 13, 1911, indicates marked effect from backwater at this station, and estimates of discharge for 1911 are withheld until this effect can be more fully investigated. For a statement of general conditions at this station see Water Supply Papers 263 and 283.

Cooperation.—This station is now maintained by the Water Supply Commission of Pennsylvania, which supplied the records of gage heights and discharge measurements for 1911.

The following discharge measurement was made by F. E. Langenheim, an engineer of the Water Supply Commission of Pennsylvania:

July 13, 1911: Gage height, 2.75 feet; discharge, 396 second-feet.

Daily gage height, in feet, of Youghiogheny River at Confluence, Pa., for 1911.

[L. L. Mountain, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.20	5.10	3.70	3.10	3.00	2.60	2.80	1.75	5.20	4.35	2.7	2.9
2	5.00	4.45	3.60	3.05	2.85	2.35	2.65	1.75	4.00	6.50	2.7	2.9
3	6.10	4.00	3.50	3.00	2.75	2.25	2.50	1.80	3.40	5.50	2.6	2.85
4	5.00	3.85	3.40	3.40	2.65	2.15	2.45	3.30	3.00	6.10	2.6	2.85
5	4.10	3.75	3.35	7.70	2.60	2.05	2.45	2.75	2.80	4.20	2.45	2.8
6	3.60	3.65	3.40	9.50	2.55	2.00	2.40	2.50	3.20	3.80	2.45	2.75
7	3.25	3.45	3.40	6.35	2.45	2.00	2.40	2.40	3.20	6.00	4.25	2.8
8	3.00	3.30	3.45	5.15	2.40	2.00	2.55	2.30	3.10	5.30	3.75	2.75
9	2.80	3.40	3.45	5.05	2.35	1.95	2.25	2.20	3.00	4.90	3.5	2.9
10	2.60	3.15	3.40	4.90	2.20	1.80	2.15	2.05	2.80	4.10	3.2	2.95
11	2.90	3.15	3.40	4.45	2.25	1.90	2.15	2.15	2.90	4.30	3.05	2.95
12	3.20	3.05	3.40	4.00	2.20	2.95	2.15	2.10	2.85	4.20	3.0	2.95
13	12.40	3.05	3.30	3.70	2.15	3.90	2.10	2.05	2.85	3.80	2.95	2.9
14	8.60	3.35	3.40	3.65	2.15	3.20	2.05	2.05	3.00	3.70	3.1	2.95
15	7.20	4.00	3.80	4.20	2.10	3.00	2.05	2.00	10.10	4.40	2.95	3.05
16	5.80	3.65	3.70	4.00	2.10	2.75	1.95	1.95	9.70	4.10	2.85	3.45
17	4.75	3.45	3.65	3.80	2.05	2.35	1.85	1.90	5.80	4.0	2.9	3.5
18	4.00	3.20	3.60	3.70	2.05	3.20	1.75	1.90	4.40	6.2	4.45	4.55
19	3.55	3.00	3.75	3.60	2.00	5.10	1.70	1.85	4.20	5.2	4.3	4.05
20	3.20	2.80	4.80	3.90	1.90	3.90	1.70	1.70	4.30	4.4	3.7	3.85
21	3.20	2.80	4.40	3.90	2.00	3.45	1.70	1.70	4.40	4.1	3.55	3.75
22	3.20	2.70	4.10	4.05	2.00	3.00	1.70	1.60	4.40	3.8	3.5	3.85
23	3.15	2.70	3.90	4.55	2.00	2.80	1.70	1.50	3.95	3.9	3.35	3.8
24	3.10	2.75	3.75	4.15	2.25	2.65	1.70	1.40	3.50	3.7	3.2	4.05
25	3.05	2.85	3.60	3.95	2.15	2.50	1.70	1.90	3.00	3.45	3.15	3.95
26	3.30	3.20	3.50	3.75	2.05	3.60	1.70	3.00	2.90	3.4	3.1	3.95
27	4.80	4.00	3.40	3.50	1.95	4.50	1.70	2.60	2.80	3.2	3.1	3.95
28	4.90	3.75	3.35	3.30	1.90	3.90	1.70	2.90	2.80	3.0	3.0	3.95
29	5.55	.....	3.30	3.15	1.90	3.40	1.70	7.50	9.00	2.9	3.0	4.4
30	12.65	.....	3.20	2.90	2.00	3.35	1.70	7.60	5.90	2.7	2.95	3.85
31	7.15	.....	3.20	.....	2.10	.....	1.70	9.65	.....	2.8	.....	6.1

CASSELMAN RIVER AT CONFLUENCE, PA.

Location.—At highway bridge about 500 yards from the railroad station and a few hundred yards above the junction of Casselman and Youghiogheny rivers.

Records available.—September 15, 1904, to December 31, 1911.

Drainage area.—450 square miles.

Gage.—Chain gage attached to bridge; datum unchanged since established.

Channel.—Probably permanent.

Discharge measurements.—Made from upstream side of bridge.

Winter flow.—Relation of gage height to discharge is more or less affected by ice during the winter months.

Accuracy.—Estimates of discharge for 1911 are withheld for the present. For a discussion of the general conditions at this station see Water-Supply Papers 263 and 283.

Cooperation.—Station is now maintained by the Water Supply Commission of Pennsylvania, which furnished the records of gage heights and discharge measurements for 1911.

The following discharge measurement was made by F. E. Langenheim, an engineer of the Water Supply Commission of Pennsylvania:

July 13, 1911: Gage height, 2.32 feet; discharge, 381 second-feet.

Daily gage height, in feet, of Casselman River at Confluence, Pa., for 1911.

[L. L. Mountain, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.05	4.05	3.00	2.85	2.65	2.45	2.25	1.6	4.5	3.25	2.4	2.4
2	3.90	3.55	2.95	2.75	2.95	2.2	2.15	1.6	3.5	5.7	2.35	2.35
3	5.45	3.15	2.85	2.65	2.85	2.1	2.1	1.65	2.9	4.25	2.3	2.35
4	3.90	3.05	2.75	3.00	2.75	2.0	2.1	1.8	2.8	4.4	2.25	2.3
5	3.05	2.95	2.70	6.85	2.65	1.9	2.05	2.1	2.65	3.65	2.25	2.3
6	2.80	2.85	2.90	8.95	2.55	2.3	2.05	1.9	3.1	3.35	2.25	2.3
7	2.65	2.80	2.85	5.70	2.45	2.15	2.05	1.9	3.0	5.9	3.4	2.3
8	2.55	2.75	2.85	4.35	2.35	2.05	2.2	1.85	2.9	4.45	3.05	2.3
9	2.50	2.80	2.80	4.15	2.30	1.95	2.1	1.85	2.85	3.5	2.85	2.35
10	2.45	2.70	2.75	4.00	2.25	1.9	2.05	1.75	2.7	3.15	2.75	2.55
11	2.65	2.60	2.75	3.70	2.15	1.9	2.05	1.8	2.75	3.35	2.55	2.55
12	3.35	2.55	2.75	3.40	2.10	3.2	2.05	1.8	2.7	3.2	2.45	2.5
13	11.70	2.55	2.85	3.20	2.05	2.95	2.0	1.8	2.75	2.85	2.55	2.5
14	7.45	3.00	2.95	3.15	2.05	2.7	2.0	1.75	2.9	2.75	2.55	2.55
15	6.05	3.95	3.20	3.55	2.05	2.55	2.0	1.7	10.9	3.3	2.5	3.45
16	4.35	3.35	3.10	3.15	2.05	2.35	1.9	1.7	10.2	3.05	2.4	6.1
17	3.45	3.15	3.05	3.05	2.00	2.55	1.8	1.7	7.6	3.0	2.4	4.6
18	3.15	2.95	2.95	2.95	2.00	8.95	1.7	1.65	4.0	5.3	4.05	3.95
19	2.95	2.80	3.20	2.85	1.95	4.35	1.6	1.65	3.8	4.2	3.45	3.25
20	2.75	2.70	3.95	3.35	1.95	3.45	1.6	1.55	3.3	3.45	3.0	3.05
21	2.75	2.65	3.75	3.20	1.95	3.0	1.6	1.6	3.3	3.2	2.85	2.95
22	2.65	2.60	3.60	3.20	1.95	2.75	1.6	1.55	3.2	3.05	2.8	3.05
23	2.55	2.60	3.50	3.65	1.95	2.55	1.6	1.5	2.9	3.35	2.7	3.05
24	2.50	2.75	3.40	3.25	2.45	2.45	1.6	1.4	2.6	3.15	2.65	3.35
25	2.40	2.85	3.35	3.15	2.35	2.35	1.6	1.6	2.35	2.9	2.65	3.45
26	2.75	3.15	3.30	3.05	2.25	3.15	1.6	1.8	2.35	2.8	2.55	3.45
27	3.85	3.65	3.25	2.95	2.1	2.95	1.6	2.0	2.25	2.75	2.55	6.7
28	3.95	3.35	3.15	2.85	1.95	3.0	1.6	2.5	3.8	2.55	2.5	4.65
29	4.50	.....	3.10	2.75	1.95	2.65	1.6	6.7	5.75	2.5	2.5	3.45
30	11.75	.....	3.05	2.65	2.45	2.4	1.6	6.4	3.9	2.45	2.5	3.25
31	5.95	.....	2.95	.....	2.25	.....	1.6	8.9	.....	2.5	.....	5.35

NOTE.—Relation of gage height to discharge affected by backwater from Youghiogheny River Jan. 3, 13 to 16, 29 to 31; Apr. 5 to 10; June 18, 19; Aug. 29 to 31; Sept. 1, 15 to 17, 29; Oct. 2 to 4, 7, 8, 18, 19, and Dec. 16, 17, 27, 28, and 31.

LAUREL HILL CREEK AT CONFLUENCE, PA.

Location.—At highway bridge about one-fourth mile from the railroad station and only a few hundred yards above the junction of the creek with Youghiogheny River.

Records available.—September 15, 1904, to December 31, 1911.

Drainage area.—126 square miles. (Revised since last report.)

Gage.—Chain gage attached to bridge; datum unchanged since established.

Channel.—Shifts as result of refuse dumped into the creek from a tannery a short distance above the bridge.

Discharge measurements.—Made from the downstream side of the bridge.

Winter flow.—Ice may affect the relation of gage height to discharge during short periods.

Accuracy.—Relation of gage height to discharge is affected by backwater from the Youghiogheny and by shift of channel at bridge. As a result the records of flow at this station are not so good as at the other two stations at Confluence. Estimates of discharge for 1911 are withheld for the present. For a discussion of general conditions at this station, see Water Supply Papers 263 and 283.

Cooperation.—This station is now maintained by the Water Supply Commission of Pennsylvania, which furnished the records of gage heights and discharge measurements for 1911.

The following discharge measurement was made by F. E. Langenheim, an engineer of the Water Supply Commission of Pennsylvania:

July 13, 1911: Gage height, 4.10 feet; discharge, 875 second-feet.

Daily gage height, in feet, of Laurel Hill Creek at Confluence, Pa., for 1911.

[L. L. Mountain, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.06	3.36	3.06	2.71	2.58	2.58	2.23	1.70	3.85	2.80	2.20	2.45
2	3.26	3.01	3.01	2.66	2.88	2.28	2.08	1.70	2.80	4.00	2.15	2.40
3	4.26	2.66	2.96	2.61	2.78	2.18	2.03	1.65	2.20	3.50	2.10	2.40
4	3.36	2.66	2.86	3.01	2.68	2.08	1.98	1.60	2.15	3.25	2.10	2.35
5	2.96	2.66	2.81	4.86	2.58	1.93	1.98	1.70	2.10	3.10	2.05	2.35
6	2.71	2.61	2.81	6.56	2.48	2.03	1.93	1.65	2.70	2.80	2.20	2.35
7	2.56	2.61	2.81	3.71	2.38	1.93	1.93	1.65	2.70	4.55	3.05	2.35
8	2.46	2.56	2.81	3.76	2.28	1.88	2.18	1.65	2.60	3.50	2.90	2.40
9	2.41	2.56	2.76	3.36	2.18	1.83	1.98	1.65	2.60	3.00	2.80	2.45
10	2.36	2.51	2.76	3.36	2.13	1.78	1.93	1.65	2.50	3.15	2.70	2.65
11	2.66	2.46	2.76	3.26	2.08	1.78	1.93	1.60	2.50	3.00	2.60	2.65
12	3.56	2.41	2.71	3.01	2.03	3.53	1.93	1.60	2.50	2.80	2.50	2.60
13	9.56	2.46	2.71	2.96	2.03	2.98	[a] 3.61	1.60	2.45	2.60	2.60	2.60
14	5.96	3.01	2.76	2.96	2.03	2.73	2.40	1.60	2.75	2.50	2.55	2.70
15	4.56	3.46	2.86	3.16	2.03	2.58	2.20	1.60	6.80	3.35	2.45	3.25
16	3.71	3.16	2.76	2.91	2.03	2.38	2.10	1.60	5.60	3.20	2.45	4.35
17	3.21	2.96	2.76	2.81	2.03	2.58	1.90	1.60	3.00	3.10	2.45	3.65
18	3.06	2.86	2.76	2.76	1.98	6.88	1.85	1.60	2.80	4.05	3.85	3.25
19	2.96	2.76	2.96	2.81	1.98	3.58	1.80	1.55	2.80	3.50	3.35	2.95
20	2.76	2.71	3.36	3.26	1.98	2.98	1.70	1.55	2.80	3.20	3.00	2.90
21	2.76	2.66	3.26	3.11	1.93	2.78	1.70	1.50	2.90	2.95	2.90	2.95
22	2.66	2.61	3.16	3.16	1.93	2.58	1.70	1.50	3.40	2.80	2.85	2.95
23	2.56	2.61	3.06	3.21	1.88	2.43	1.70	1.45	2.95	2.70	2.75	2.90
24	2.51	2.61	3.01	3.01	2.28	2.33	1.70	1.40	2.60	2.60	2.70	3.00
25	2.41	2.66	2.96	2.91	2.18	2.28	1.70	1.50	2.50	2.55	2.65	3.00
26	2.81	2.76	2.91	2.81	2.08	2.78	1.70	1.60	2.40	2.50	2.60	3.00
27	3.06	3.16	2.86	2.71	1.98	3.18	1.70	1.75	2.30	2.40	2.60	4.40
28	3.11	3.16	2.86	2.61	1.88	3.13	1.70	1.80	6.50	2.30	2.55	3.50
29	3.51	.....	2.81	2.56	1.88	2.73	1.70	4.70	4.45	2.25	2.50	3.15
30	8.96	.....	2.76	2.51	2.28	2.48	1.70	4.30	3.30	2.20	2.50	2.95
31	4.96	.....	2.71	.....	2.08	.....	1.70	6.00	.....	2.20	.....	4.20

[a] Maximum, 4.30 feet at 12.20 p. m.

NOTE.—The gage box was struck by a wagon about May 1, according to the observer; on July 13, 1911, the gage was checked with a wye level, found to be in error, and put in general condition to read correctly. Proper correction has been applied to observed gage heights May 1 to July 13, and values published above are correct.

MUSKINGUM RIVER BASIN.

MUSKINGUM RIVER AT ZANESVILLE, OHIO.

Location.—At lower pool at Lock No. 10, Zanesville, Ohio, and 4,000 feet below the mouth of Licking River.

Records available.—June 4, 1887, to December 31, 1911. The United States Geological Survey began making measurements at this station in March, 1905.

Drainage area.—5,820 square miles. (Revised since last report.)

Gage.—Staff gage in lower pool at Lock No. 10; datum probably unchanged since established.

Channel.—The crest of the dam at Lock No. 9, 9 miles below Lock No. 10, acts as a point of control for the gage. As the dams on the Muskingum are fixed dams, the relation between gage height and discharge should be permanent, and once determined, would apply indefinitely if conditions at the dams remained unchanged. See notes under **Accuracy.**

Discharge measurements.—Made from upstream side of Sixth Street Bridge, 1,000 feet above Lock No. 10.

Floods.—The maximum flood gage height, according to the United States Weather Bureau, was 36.8 feet March 24, 1898.

Point of zero flow.—The crest of Dam No. 9 acts as a point of control except as the water may be drawn off by openings in the lock or leakage through the dam. The elevation of the crest is 7.0 feet, referred to gage datum.

Winter flow.—The relation of gage height to discharge is sometimes affected during the winter months by ice cover and occasionally by ice jams.

Artificial control.—The operation of two power plants at Dam No. 9 modifies the flow past the lower gage at Dam No. 10 to an unknown extent.

Accuracy.—Investigations and studies made during 1912 (before the preparation of this report) show that the records at this station are practically worthless as a means of making accurate determinations of discharge, because of leakage through Dam No. 9 prior to 1907 and the operation of the two power plants at Dam No. 9. All estimates of discharge previously published for this station should therefore be used with great caution, as they are in error an unknown amount; the lower the flow the greater the possible error.

Cooperation.—Gage readings are furnished by United States Army Engineers.

Daily gage height, in feet, of Muskingum River at Zanesville, Ohio, for 1911.

[Lower gage Lock No. 10.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	14.3	18.6	11.2	12.6	10.9	8.2	8.4	7.7	9.6	9.2	9.2	10.2
2	14.1	17.4	10.6	12.2	11.2	8.2	8.05	7.5	9.0	9.4	9.4	9.9
3	14.8	16.6	10.3	11.6	11.5	8.1	7.9	7.7	8.6	10.0	9.4	9.8
4	13.5	16.0	10.0	11.8	11.2	8.2	7.9	7.7	8.4	10.8	9.2	9.6
5	11.4	16.0	10.0	14.6	10.6	8.2	7.9	7.7	8.4	11.2	9.0	9.5
6	10.5	14.9	9.8	17.0	10.0	8.2	7.9	7.75	8.6	11.2	8.9	9.4
7	10.5	13.9	9.8	16.8	9.7	8.6	7.8	7.9	8.45	12.7	10.5	9.5
8	10.6	13.7	10.2	15.6	9.4	8.8	7.8	7.9	8.6	13.4	10.7	9.4
9	10.4	13.8	10.3	14.6	9.4	9.0	7.85	7.9	10.4	13.4	11.0	9.8
10	10.0	13.4	11.1	13.6	9.2	8.6	8.25	7.9	11.4	12.8	10.3	13.3
11	10.0	12.6	11.8	12.9	9.0	8.45	8.15	7.8	12.6	14.0	9.8	14.6
12	10.2	11.6	11.4	12.2	9.0	8.35	8.2	7.8	11.6	12.3	9.7	16.4
13	12.8	11.0	10.6	12.9	8.9	8.2	8.35	7.7	10.4	11.9	12.2	21.0
14	15.0	11.0	10.4	15.6	9.0	8.1	8.45	7.7	9.6	11.3	12.6	21.0
15	17.4	12.2	10.2	16.6	8.9	8.0	8.1	7.8	9.8	10.8	12.2	22.2
16	18.0	14.0	10.0	15.5	8.8	8.0	7.85	8.4	17.1	10.4	11.5	21.9
17	17.4	13.8	9.8	14.5	8.7	8.1	7.8	8.5	18.0	10.7	11.2	20.8
18	16.0	13.1	9.7	13.0	8.6	8.6	7.75	8.5	18.2	15.7	12.8	19.7
19	12.5	13.0	10.4	12.0	8.5	8.0	7.7	8.35	17.9	15.8	14.4	18.5
20	11.4	13.2	11.4	14.9	8.5	8.05	7.7	8.0	15.2	15.6	14.4	15.4
21	10.6	12.4	11.0	16.2	8.5	8.2	7.8	7.9	12.2	14.8	13.6	13.3
22	10.4	11.8	10.6	16.3	8.5	8.05	7.7	7.8	10.9	13.4	12.2	12.2
23	10.4	11.2	10.1	15.2	8.5	8.0	7.7	7.7	10.2	11.9	11.5	12.2
24	10.2	10.9	10.0	14.3	8.5	8.0	7.7	7.7	9.6	11.0	11.1	12.5
25	9.7	10.9	9.8	13.2	8.5	8.0	7.7	8.1	9.3	10.4	11.4	12.7
26	9.4	11.4	9.6	12.3	8.45	8.0	7.7	9.0	9.0	10.0	11.6	12.4
27	11.4	12.0	9.5	11.4	8.3	8.0	7.7	8.9	9.0	9.8	11.2	14.0
28	16.0	11.9	9.6	10.8	8.3	8.5	7.7	8.9	8.9	9.4	10.8	14.5
29	16.9	.....	10.1	10.4	8.2	8.35	7.7	9.2	9.6	9.2	10.7	13.9
30	22.6	.....	10.8	10.2	8.1	8.15	7.7	9.5	9.0	9.2	10.5	12.9
31	20.4	.....	11.8	.....	8.2	.....	7.7	10.0	.....	9.1	.....	14.1

NOTE.—Daily gage heights are means of two readings per day furnished by United States Engineer Corps and therefore differ from those published by the United States Weather Bureau, which represent one reading each day.

MOHICAN RIVER BASIN.

MOHICAN RIVER AT POMERENE, OHIO.

Location.—At highway bridge at Pomerene, Ohio, 4 miles from Walhonding, Ohio, and 5 miles below the mouth of Owl Creek.

Records available.—December 1, 1910, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Standard chain gage attached to bridge; datum unchanged since established.

Channel.—Coarse gravel; apparently permanent.

Discharge measurements.—Made from upstream side of bridge.

Winter flow.—The relation of gage height to discharge is sometimes affected by ice cover and ice gorges during the winter months.

Diversions.—A feeder for the Ohio Canal formerly took water from the river at Cavallo, some distance above Pomerene, but this feeder has not been in use for some time.

Accuracy.—Sufficient data have not been obtained to permit estimates of discharge to be made.

Cooperation.—The gage reader's salary for part of the year was paid from the funds of the Ohio Agricultural Experiment Station.

Discharge measurements of Mohican River at Pomerene, Ohio, in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Apr. 22	P. S. Monk	7.11	4,940
24	do	6.05	3,300

Daily gage height, in feet, of Mohican River at Pomerine, Ohio, for 1911.

[F. L. Rodehaver, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.43	7.76	4.50	5.53	5.51	3.27	3.19	2.66	3.66	3.31	3.83	3.94
2	7.34	7.20	4.36	5.15	5.87	3.26	3.18	2.61	3.52	4.32	3.82	3.84
3	7.70	7.10	4.24	5.13	5.48	3.31	3.13	2.92	3.43	4.43	3.80	3.76
4	6.30	6.81	4.21	5.70	5.12	3.30	3.02	2.94	3.26	3.94	3.77	4.05
5	5.65	6.20	4.10	8.52	4.90	3.48	2.92	2.91	3.27	3.87	3.76	4.21
6	4.80	5.90	3.94	7.92	4.51	4.64	2.89	2.88	3.93	3.83	3.75	4.14
7	8.45	5.10	3.93	7.22	4.26	4.55	2.82	2.98	3.95	4.91	4.90	3.94
8	7.30	5.69	3.87	6.15	4.12	3.94	2.91	2.95	3.91	5.47	4.42	3.85
9	7.74	5.30	4.03	5.66	4.05	3.61	2.99	2.89	3.98	5.47	4.21	4.12
10	8.87	4.60	4.43	5.10	3.96	3.53	2.95	2.83	4.94	5.67	4.10	8.09
11	7.22	4.00	4.52	4.81	3.89	3.49	3.58	2.75	4.81	5.90	3.87	7.74
12	4.70	4.60	4.44	4.54	4.68	3.47	3.75	2.70	4.08	5.43	3.92	8.42
13	7.08	4.84	4.35	5.26	4.50	3.46	3.34	2.67	3.74	5.36	7.04	11.82
14	8.45	5.84	4.10	6.74	4.24	3.45	3.37	2.63	3.64	5.34	6.11	10.31
15	9.98	7.69	3.94	6.64	4.05	3.41	3.05	3.51	6.35	4.76	5.26	10.42
16	8.41	7.32	3.64	5.93	4.03	3.34	2.78	3.57	7.22	4.47	4.55	9.14
17	6.90	6.61	3.41	5.71	3.93	3.20	2.77	3.45	6.53	4.84	4.21	8.41
18	6.50	6.10	3.74	5.21	3.87	3.10	2.82	3.41	6.39	8.72	7.18	7.67
19	5.35	6.50	4.74	4.98	3.59	3.25	2.83	3.15	6.35	8.20	7.55	7.12
20	4.71	5.30	4.97	8.26	3.55	3.37	2.81	2.86	6.16	7.77	7.01	6.76
21	4.49	4.74	4.87	8.00	3.52	3.34	2.82	2.86	4.80	7.34	6.65	5.74
22	4.30	4.30	4.83	7.10	3.49	3.29	2.87	2.87	3.61	6.91	6.05	5.35
23	4.10	4.35	4.66	6.67	3.47	3.22	2.88	2.84	3.65	6.65	5.14	4.91
24	3.85	4.78	4.30	6.03	3.57	3.15	3.20	2.81	3.61	6.61	4.64	4.87
25	3.88	4.90	3.98	5.52	3.55	3.10	3.34	4.36	3.58	6.47	4.12	5.36
26	3.84	5.50	3.81	5.05	3.49	3.27	3.24	3.88	3.55	6.43	5.06	5.10
27	4.52	5.82	4.29	4.65	3.42	3.35	3.20	3.66	3.53	5.90	4.85	5.92
28	7.75	5.18	4.73	4.49	3.29	3.32	3.14	3.66	3.71	5.00	4.73	5.02
29	6.30	.....	4.50	4.47	3.26	3.27	2.90	4.78	3.55	4.20	4.44	4.51
30	8.10	.....	5.30	4.78	3.29	3.21	2.66	4.74	3.40	3.94	4.11	4.11
31	8.20	.....	5.98	.....	3.26	.....	2.72	3.90	.....	3.85	.....	4.32

NOTE.—Jan. 7 to 12 river gorged with slush ice; Jan. 8 to 11, readings to top of slush ice gorge.

KANAWHA RIVER BASIN.

SOUTH FORK OF NEW RIVER NEAR CRUMPLER, N. C.

Location.—About 2 miles above the confluence of North and South forks of New River and about 4 miles from Crumpler, N. C.

Records available.—August 12, 1908, to December 31, 1911.

Drainage area.—325 square miles.

Gage.—Standard chain gage attached to trees on left bank; datum unchanged since established.

Channel.—Practically permanent

Discharge measurements.—Made from a boat at a section about one-half mile below the gage or by wading at a section about 500 feet below the gage.

Winter flow.—Ice rarely forms in sufficient quantity to affect gage readings.

Accuracy.—The gage-height record is considered very reliable. Sufficient data have not been obtained to permit estimates of discharge to be made.

The following discharge measurement was made by Horton and Bailey:

July 24, 1911: Gage height, 0.94 feet; discharge, 232 second-feet. The measurement was made by wading at a section about 500 feet below the gage.

Daily gage height, in feet, of South Fork of New River near Crumpler, N. C., for 1911.

[John J. Garvey, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.73	1.40	1.29	1.55	1.72	1.40	1.03	1.14	1.87	1.04	1.20	1.26
2	2.05	1.39	1.30	1.52	1.70	1.39	1.00	1.02	1.47	1.07	1.18	1.28
3	2.48	1.38	1.29	1.48	1.61	1.36	1.00	1.29	1.36	1.10	1.15	1.28
4	2.61	1.38	1.27	1.56	1.58	1.32	.98	1.47	1.20	1.14	1.14	1.21
5	2.07	1.38	1.24	2.62	1.54	1.32	1.16	1.39	1.12	1.20	1.14	1.18
6	1.83	1.36	1.52	2.70	1.52	1.42	1.26	1.44	1.15	1.14	1.34	1.22
7	1.69	1.38	2.02	2.18	1.48	1.40	1.16	1.42	1.16	1.08	1.66	1.25
8	1.62	1.48	2.02	2.28	1.46	1.42	1.42	1.26	1.10	1.08	1.54	1.21
9	1.50	1.82	2.26	2.10	1.50	1.33	1.26	1.24	1.08	1.06	1.50	1.19
10	1.42	1.84	2.04	1.93	1.48	1.28	1.22	1.06	1.18	1.10	1.48	1.17
11	1.48	1.68	1.84	1.78	1.46	1.28	1.22	1.00	1.20	1.20	1.40	1.22
12	1.48	1.56	1.76	1.91	1.46	1.26	1.16	.96	1.26	1.26	1.38	1.24
13	1.42	1.52	1.60	2.46	1.54	1.22	1.16	.98	1.14	1.18	1.54	1.25
14	1.42	1.50	1.58	2.88	1.72	1.20	1.12	1.09	1.04	1.10	1.50	1.24
15	1.41	1.45	1.54	2.52	1.62	1.16	1.40	1.13	1.02	1.16	1.44	1.32
16	1.36	1.44	1.46	2.36	1.50	1.12	1.17	1.00	1.00	1.04	1.38	1.56
17	1.31	1.40	1.42	2.11	1.42	1.12	1.65	.97	1.00	1.54	1.36	1.68
18	1.40	1.38	1.42	1.96	1.40	1.12	1.05	.96	1.00	3.71	1.38	1.48
19	1.36	1.37	1.45	2.00	1.40	1.15	1.00	.96	.99	2.29	1.41	1.36
20	1.36	1.45	1.50	2.09	1.40	1.26	.98	.96	.98	1.81	1.38	1.32
21	1.37	1.41	1.46	1.94	1.40	1.20	1.06	.92	2.29	1.56	1.36	1.54
22	1.44	1.38	1.40	1.84	1.39	1.18	1.02	.87	1.89	1.52	1.32	2.09
23	1.49	1.34	1.41	1.76	1.40	1.14	.97	.87	1.63	1.54	1.30	2.35
24	1.44	1.28	1.36	1.71	1.40	1.20	.96	.87	1.49	1.48	1.34	2.08
25	1.39	1.28	1.36	1.68	1.36	1.20	.95	.87	1.42	1.36	1.32	1.96
26	1.38	1.28	1.38	1.66	1.32	1.14	.91	.92	1.32	1.28	1.30	1.80
27	1.36	1.30	1.96	1.61	1.30	1.32	.86	1.26	1.26	1.29	1.30	1.83
28	1.34	1.29	1.88	1.60	1.30	1.13	.88	1.18	1.17	1.28	1.30	1.76
29	1.34	.....	1.70	1.62	1.30	1.11	.89	1.35	1.11	1.26	1.30	1.66
30	1.54	.....	1.61	1.67	1.28	1.10	.90	1.60	1.08	1.23	1.29	1.54
31	1.52	.....	1.59	.....	1.32	.....	.92	1.94	.....	1.21	.....	1.71

NOTE.—Slush ice reported Feb. 23. Relation of gage height to discharge probably not affected by ice during 1911.

NEW RIVER NEAR GRAYSON, VA.

Location.—At Norfolk & Western Railway bridge at Fries Junction, 1 mile from Grayson, Va., immediately above the mouth of Chestnut Creek.

Records available.—August 7, 1908, to December 31, 1911.

Drainage area.—1,160 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged since established.

Channel.—Irregular but practically permanent. The river at the measuring section is wide, with an irregular, rocky bottom; current rough and rapid.

Discharge measurements.—Made from downstream side of bridge.

Winter flow.—Gage heights are little, if at all, affected by ice.

Artificial control.—The operation of a large cotton mill, run by water power, about 4 miles above the gage affects the flow of the river during low water.

Accuracy.—The characteristics noted under "channel" make this a rather poor station, but with careful work accurate discharge measurements can be made. Sufficient data have not been obtained to permit estimates of discharge to be made.

The following discharge measurement was made by C. T. Bailey:

July 21, 1911: Gage height, 3.69 feet; discharge, 872 second-feet. These results were obtained by subtracting the inflow (Chestnut and Brush creeks) between sections at Fries Junction and Grayson (20 second-feet, measured by means of floats) from the discharge measured at Grayson, W. Va. See "Miscellaneous measurements," page 105.

Daily gage height, in feet, of New River near Grayson, Va., for 1911.

[Oscar Williams, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.31	4.70	3.88	4.24	4.50	4.00	3.65	3.46	4.42	3.59	3.70	3.83
2	5.31	4.44	3.88	4.18	4.52	3.89	3.62	3.59	4.09	3.44	3.68	3.79
3	5.92	4.26	3.89	4.16	4.37	3.86	3.58	3.55	4.81	3.60	3.69	3.79
4	6.16	4.17	3.86	4.18	4.27	3.80	3.59	3.74	3.66	3.58	3.64	3.78
5	5.24	4.20	3.80	5.74	4.22	3.80	3.72	3.94	3.60	3.59	3.66	3.73
6	4.70	4.10	3.87	6.69	4.18	4.26	4.08	3.86	3.60	3.64	3.74	3.74
7	4.40	4.09	4.46	5.68	4.15	4.12	3.78	3.82	3.61	3.58	4.18	3.78
8	4.37	4.12	4.90	5.61	4.14	4.06	3.89	3.80	3.63	3.55	4.25	3.73
9	4.22	4.84	5.49	5.29	4.10	3.84	3.82	3.68	3.54	3.56	4.10	3.72
10	4.11	5.26	5.42	4.95	4.09	3.87	3.78	3.60	3.60	3.58	4.09	3.70
11	3.98	4.94	5.18	4.82	4.06	3.82	3.78	3.62	3.61	3.62	4.06	3.70
12	4.09	4.63	4.62	4.78	4.05	3.79	3.79	3.48	3.84	3.72	4.00	3.72
13	4.06	4.47	4.50	4.96	4.24	3.78	3.82	3.65	3.78	3.70	4.06	3.74
14	4.00	4.37	4.44	5.39	4.89	3.74	3.82	3.56	3.67	3.63	4.05	3.72
15	4.00	4.24	4.38	5.68	4.48	3.69	3.82	3.62	3.55	3.60	3.98	3.79
16	4.04	4.16	4.28	5.57	4.25	3.68	3.70	3.55	3.56	3.68	3.90	4.00
17	3.98	4.10	4.16	5.18	4.13	3.67	3.66	3.54	3.51	4.00	3.86	4.20
18	3.95	4.06	4.10	4.86	4.08	3.70	3.59	3.51	3.55	7.22	3.82	4.10
19	3.92	4.02	4.12	4.76	4.06	3.73	3.55	3.54	3.54	5.26	3.92	3.92
20	3.93	4.02	4.19	5.00	4.00	3.84	3.59	3.54	3.50	4.42	3.92	3.90
21	3.94	4.11	4.17	4.84	3.99	3.90	3.60	3.28	3.59	4.26	3.90	3.89
22	4.00	3.94	4.07	4.67	3.98	3.76	3.57	3.46	4.51	4.00	3.85	4.84
23	3.98	3.87	4.02	4.56	3.96	3.69	3.27	3.29	4.10	4.10	3.82	5.38
24	4.17	3.96	4.02	4.46	3.94	3.68	3.56	3.28	3.86	4.04	3.82	4.93
25	4.28	3.94	4.01	4.38	3.94	3.76	3.54	3.26	3.78	3.92	3.90	4.76
26	4.18	3.91	3.98	4.32	3.90	3.78	3.50	3.31	3.69	3.82	3.88	4.60
27	4.16	3.90	4.34	4.26	3.86	3.74	3.54	3.74	3.62	3.79	3.82	4.62
28	4.13	3.89	4.58	4.21	3.83	4.04	3.54	3.70	3.60	3.78	3.84	4.56
29	4.20	.....	4.43	4.24	3.81	3.90	3.41	3.74	3.58	3.75	3.84	4.31
30	4.25	.....	4.33	4.28	3.80	3.77	3.53	4.14	3.53	3.73	3.87	4.30
31	4.59	.....	4.32	.....	3.87	.....	3.56	4.17	.....	3.72	.....	4.29

NOTE.—No ice reported. Relation of gage height to discharge probably not affected by ice during 1911.

NEW RIVER AT RADFORD, VA.

Location.—At toll highway bridge near the Norfolk & Western Railway station at Radford, Va., 1½ miles below Norfolk & Western Railway bridge and 6 miles below the mouth of Little River.

Records available.—August 1, 1898, to July 15, 1906; May 6, 1907, to December 31, 1911.

Drainage area.—2,720 square miles.

Gage.—Standard chain gage attached to bridge. The United States Weather Bureau gage was originally used at this point, but owing to its inaccessibility it was replaced by a wire gage referred to the same datum February 23, 1900. On December 1, 1903, the wire gage was replaced by a chain gage and the datum lowered 3.41 feet to avoid negative readings.

Channel.—Practically permanent.

Discharge measurements.—Made from the downstream side of the bridge.

Floods.—Maximum gage height, according to United States Weather Bureau, was 37.4 feet September 15, 1879.

Point of zero flow.—A determination by leveling July 17, 1911, indicates that there would be no flow past the gage if the river stage were to fall to 1.0 foot±0.3 foot.

Winter flow.—The relation of gage height to discharge is only occasionally affected by ice.

Artificial control.—Power plants 50 miles above station may affect flow to a small extent.

Accuracy.—A good discharge rating curve for this station has been obtained as a result of numerous discharge measurements, but the data in the following tables can not be considered good because of doubt as to the accuracy of the daily gage heights. Gage heights published in the following table represent the means of two readings per day as reported by the observer. During portions of September, October, and November, 1911, the gage was read by a substitute gage observer. A comparison of the readings on the United States Geological Survey and United States Weather Bureau gages at Radford and a gage at Newbern, about 10 or 12 miles above Radford, during this period, indicates that the substitute observer read the Geological Survey gage erroneously on September 24, September 27 to October 16, and October 24 to November 6, 1911. A correction of +0.5 foot, as indicated by the comparison, has been applied to the observed gage heights on the days in question. As the basis for this correction is not absolute, the discharge values computed therefrom should be used with caution. Four discharge measurements between gage heights 6.0 and 11.0 feet made March 28–29, 1913 (before the preparation of this report) indicate a change in the regimen of the river such that the 1913 discharge rating curve above gage height 5.0 feet will give results about 6 per cent smaller than those given by the 1911 rating curve for corresponding gage heights. It is possible though not probable, that this change should apply during 1911, and published values of discharge should be used with caution until verified by discharge measurements below 6.0 feet.

The following discharge measurement was made by Horton and Bailey:

July 17, 1911: Gage height, 3.38 feet; discharge, 1,510 second-feet.

Daily gage height, in feet, of New River at Radford, Va., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.5	5.05	3.6	4.25	4.2	3.8	3.5	3.15	4.63	3.28	3.25	3.02
2	5.3	4.6	3.5	4.15	4.3	3.65	3.3	3.08	4.26	3.33	3.06	3.10
3	6.3	4.3	3.5	4.05	4.2	3.45	3.25	3.08	3.91	3.75	3.11	3.63
4	7.1	4.05	3.5	4.6	4.15	3.55	3.3	3.10	3.60	3.81	3.08	3.61
5	5.4	4.0	3.6	5.9	4.0	3.6	3.4	3.69	3.41	3.51	2.99	3.53
6	4.7	4.0	3.7	8.1	3.95	3.65	3.6	4.24	3.26	3.43	3.30	3.52
7	4.5	3.9	4.1	6.85	4.0	4.2	3.5	3.68	3.00	3.34	3.39	3.62
8	4.4	4.0	4.7	6.45	4.0	4.15	4.55	3.50	3.10	3.28	3.75	3.63
9	3.9	4.95	5.2	6.2	4.0	3.95	3.75	3.41	3.05	3.44	3.77	3.60
10	3.95	5.95	5.95	5.55	4.0	3.7	3.6	3.30	3.15	3.53	3.50	3.56
11	3.85	5.2	5.7	5.2	3.85	3.6	3.75	3.20	3.15	3.63	3.29	3.60
12	3.65	4.75	5.0	5.0	3.8	4.05	3.55	3.08	3.21	3.64	3.65	3.59
13	3.7	4.45	4.75	5.05	3.95	3.6	3.5	3.38	3.11	3.53	3.75	3.60
14	3.65	4.35	4.5	5.35	4.6	3.6	3.55	3.49	3.27	3.43	3.57	3.62
15	3.7	3.9	4.6	5.85	4.85	3.35	3.55	3.29	3.17	3.44	3.53	4.00
16	3.65	4.15	4.35	6.3	4.3	3.35	3.5	3.22	3.00	3.55	3.74	4.55
17	3.5	3.95	4.15	5.55	4.05	3.3	3.35	3.17	2.96	3.41	3.75	4.53
18	3.6	3.9	4.05	5.1	4.05	3.3	3.4	3.15	2.96	8.11	3.57	4.17
19	3.6	4.0	4.1	4.9	4.0	3.35	3.3	3.12	3.05	6.06	3.44	3.93
20	3.65	4.0	3.9	4.95	3.8	3.45	3.25	3.09	2.87	4.51	3.80	3.85
21	3.65	3.95	4.0	5.15	3.75	3.6	3.25	3.05	2.92	3.96	3.73	3.83
22	3.95	3.7	3.9	5.0	3.35	3.55	3.2	2.85	3.99	3.96	3.63	3.94
23	4.8	3.6	3.85	4.7	3.7	3.45	3.1	2.96	4.25	4.11	3.63	5.63
24	4.65	3.6	3.7	4.5	3.8	3.35	3.1	2.97	3.85	3.51	3.73	5.48
25	4.35	3.6	3.8	4.35	3.8	3.45	3.15	2.88	3.29	3.43	3.63	5.22
26	4.2	3.7	3.85	4.2	3.75	3.55	3.15	2.95	3.26	3.48	3.75	5.24
27	3.95	3.75	4.0	4.2	3.55	3.5	3.06	3.30	3.55	3.31	3.72	5.26
28	3.95	3.7	4.35	4.2	3.45	3.85	3.19	3.41	3.57	3.20	3.65	5.18
29	4.05	.....	4.35	4.15	3.45	4.0	3.11	4.56	3.34	3.32	3.04	4.94
30	4.4	.....	4.2	4.2	3.5	3.55	3.11	4.36	3.35	3.30	3.15	4.30
31	5.4	.....	4.2	.....	3.55	.....	3.18	4.62	.....	3.22	.....	4.33

NOTE.—Gage heights Sept. 24, Sept. 27 to Oct. 16, and Oct. 24 to Nov. 6 are 0.5 foot greater than the mean gage height for each day as reported by the gage observer. (See *Accuracy.*)

Observer made no notes relative to ice. Relation of gage height to discharge probably not affected by ice during 1911.

Daily discharge, in second-feet, of New River at Radford, Va., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4,930	6,980	2,080	4,060	3,890	2,630	1,820	1,060	5,400	1,320	1,260	816
2	7,950	5,290	1,820	3,720	4,230	2,220	1,360	924	4,090	1,430	888	960
3	12,100	4,230	1,820	3,400	3,890	1,700	1,260	924	2,960	2,490	979	2,160
4	15,600	3,400	1,820	5,290	3,720	1,950	1,360	960	2,080	2,660	924	2,110
5	8,350	3,240	2,080	10,400	3,240	2,080	1,580	2,320	1,600	1,850	764	1,900
6	5,650	3,240	2,350	20,100	3,080	2,220	2,080	4,030	1,280	1,650	1,360	1,870
7	4,930	2,930	3,560	14,400	3,240	3,890	1,820	2,300	780	1,450	1,560	2,130
8	4,580	3,240	5,650	12,700	3,240	3,720	5,110	1,820	960	1,320	2,490	2,160
9	2,930	6,590	7,560	11,600	3,240	3,080	2,490	1,600	870	1,680	2,550	2,080
10	3,080	10,600	10,600	8,950	3,240	2,350	2,080	1,360	1,060	1,900	1,820	1,980
11	2,780	7,560	9,560	7,560	2,780	2,080	2,490	1,150	1,060	2,160	1,340	2,080
12	2,220	5,840	6,780	6,780	2,630	3,400	1,950	924	1,170	2,190	2,220	2,050
13	2,350	4,760	5,840	6,980	3,080	2,080	1,820	1,540	979	1,900	2,490	2,080
14	2,220	4,400	4,930	8,150	5,290	2,080	1,950	1,800	1,300	1,650	2,000	2,130
15	2,350	2,930	5,290	10,200	6,210	1,470	1,950	1,340	1,090	1,680	1,900	3,240
16	2,220	3,720	4,400	12,100	4,230	1,470	1,820	1,190	780	1,950	2,460	5,110
17	1,820	3,080	3,720	8,950	3,400	1,360	1,470	1,090	716	1,600	2,490	5,040
18	2,080	2,930	3,400	7,170	3,400	1,360	1,580	1,060	716	20,200	2,000	3,790
19	2,080	3,240	3,560	6,400	3,240	1,470	1,360	998	870	11,100	1,680	3,020
20	2,220	3,240	2,930	6,590	2,630	1,700	1,260	942	578	4,970	2,630	2,780
21	2,220	3,080	3,240	7,360	2,490	2,080	1,260	870	652	3,120	2,430	2,720
22	3,080	2,350	2,930	6,780	1,470	1,950	1,150	550	3,210	3,120	2,160	3,050
23	6,020	2,080	2,780	5,650	2,350	1,700	960	716	4,060	3,590	2,160	9,270
24	5,470	2,080	2,350	4,930	2,630	1,470	960	732	2,780	1,850	2,430	8,670
25	4,400	2,080	2,630	4,400	2,630	1,700	1,060	592	1,340	1,650	2,160	7,640
26	3,890	2,350	2,780	3,890	2,490	1,950	1,060	700	1,280	1,770	2,490	7,720
27	3,080	2,490	3,240	3,890	1,950	1,820	888	1,360	1,950	1,380	2,410	7,790
28	3,080	2,350	4,400	3,890	1,700	2,780	1,130	1,600	2,000	1,150	2,220	7,480
29	3,400	.....	4,400	3,720	1,700	3,240	979	5,150	1,450	1,400	852	6,550
30	4,580	.....	3,890	3,890	1,820	1,950	979	4,440	1,470	1,360	1,060	4,230
31	8,350	.....	3,890	.....	1,950	.....	1,110	5,360	.....	1,190	.....	4,340

NOTE.—Daily discharge computed from a rating curve well defined between 800 and 17,000 second-feet. (See *Accuracy.*)

Monthly discharge of New River at Radford, Va., for 1911.

[Drainage area, 2,720 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	15,600	1,820	4,520	1.66	1.91	B.
February	10,600	2,080	3,940	1.45	1.51	B.
March	10,600	1,820	4,070	1.50	1.73	B.
April	20,100	3,400	7,460	2.74	3.06	B.
May	6,210	1,470	3,070	1.13	1.30	B.
June	3,890	1,360	2,160	.794	.89	A.
July	5,110	888	1,620	.596	.69	A.
August	5,360	550	1,660	.610	.70	A.
September	5,400	578	1,680	.618	.69	B.
October	20,200	1,150	2,860	1.05	1.21	C.
November	2,630	764	1,870	.688	.77	B.
December	9,270	816	3,840	1.41	1.63	B.
The year	20,200	550	3,220	1.18	16.09	

NOTE.—See *Accuracy* in station description.

NEW RIVER AT FAYETTE, W. VA.

Location.—At highway bridge connecting Fayette and South Fayette, W. Va., 850 feet above the mouth of Wolf Creek.

Records available.—July 29, 1895, to May 22, 1901; August 11, 1902, to December 31, 1904; July 16, 1908, to December 31, 1911.

Drainage area.—6,800 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged since established.

Channel.—Rock bed strewn with large bowlders which cause boils and eddies at high stages.

Discharge measurements.—Made from upstream side of bridge.

Floods.—The flood of 1878 reached a height of about 53 feet as referred to by the present gage datum.

Winter flow.—The relation of gage height to discharge is little if at all affected by ice.

Accuracy.—Errors have entered into many of the gage readings prior to 1908, particularly before the chain gage was installed, November 20, 1903, the original wire gage being frequently many tenths in error. Owing to this cause and to the difficulty in making accurate measurements, all estimates of discharge heretofore published are only fair. Estimates of discharge for 1911 are withheld from publication for the present.

Daily gage height, in feet, of New River at Fayette, W. Va., for 1911.

[A. E. Pierson, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	8.15	13.55	3.76	6.93	5.45	2.37	1.85	0.09	3.05	0.65	2.08	3.45
2	12.50	11.23	3.90	6.78	5.72	2.42	1.50	.06	4.60	.85	1.82	3.28
3	14.75	9.45	3.78	8.00	5.55	2.57	1.23	.04	4.35	5.60	1.68	2.95
4	18.10	7.92	3.68	12.18	5.29	2.38	1.10	.02	3.55	4.90	1.35	2.82
5	14.40	7.82	3.48	14.20	4.82	2.34	1.24	.00	2.20	3.50	1.18	2.62
6	10.68	7.70	9.33	17.63	4.43	2.46	1.97	.12	1.72	2.60	3.02	2.42
7	7.60	6.70	13.78	16.42	4.17	2.68	1.73	1.52	1.48	2.05	6.20	2.25
8	6.15	5.48	10.86	14.62	3.95	2.58	1.97	2.55	1.30	2.15	9.72	2.24
9	5.45	6.88	10.06	14.52	3.72	3.20	2.53	1.95	.92	2.20	8.52	2.20
10	5.42	8.48	11.40	14.27	3.55	3.16	3.32	1.50	.78	3.75	5.78	2.05
11	5.15	11.78	13.60	10.97	3.52	2.66	2.93	1.28	1.38	3.40	4.88	2.02
12	4.42	9.26	11.83	9.22	3.39	2.21	2.73	1.05	1.72	3.50	4.58	2.00
13	3.52	8.13	10.18	8.19	3.29	2.06	2.23	.85	1.78	3.10	4.58	1.90
14	3.62	6.73	8.58	7.95	3.15	2.16	1.95	2.38	1.60	2.80	4.54	1.98
15	6.55	5.98	8.50	8.37	4.09	1.61	1.70	2.05	1.25	2.40	4.48	1.95
16	5.60	5.33	7.68	12.59	4.85	1.51	1.65	1.60	1.05	2.35	4.38	2.20
17	5.38	4.78	6.90	12.45	4.07	1.26	1.65	1.38	1.05	3.95	4.80	2.70
18	5.25	4.38	6.33	9.87	3.39	1.24	1.37	1.18	3.15	11.00	4.20	3.80
19	4.92	4.20	6.56	8.47	2.99	1.28	1.20	.90	2.50	18.05	4.65	4.75
20	4.68	5.78	7.53	8.37	2.77	1.44	.95	.55	1.85	10.65	6.00	4.45
21	4.82	6.03	7.40	9.97	2.55	1.61	.70	.38	1.20	7.50	5.23	3.38
22	5.70	5.58	6.90	9.92	2.42	1.84	.63	.15	1.00	6.65	4.60	3.05
23	6.65	5.06	6.63	8.92	2.31	1.78	.53	.05	.90	4.75	3.90	3.62
24	8.70	4.56	6.00	8.02	2.21	1.74	.40	.12	1.00	4.65	3.50	10.20
25	7.60	4.18	5.38	7.35	2.29	1.66	.42	.25	1.55	4.45	3.75	9.90
26	6.65	4.10	4.88	6.45	2.21	1.58	.27	.38	1.55	3.85	3.65	9.40
27	6.55	3.98	4.50	5.99	2.11	1.78	.23	.38	1.15	3.30	3.85	9.85
28	7.05	3.90	6.50	5.52	2.03	2.11	.15	.22	1.05	3.38	3.55	9.50
29	8.55	.....	7.42	5.35	1.81	2.04	.05	.30	.90	3.55	3.65	9.15
30	16.35	.....	7.08	5.35	2.07	2.51	.10	1.60	.65	2.18	3.55	8.20
31	19.58	.....	6.93	.....	2.18	.....	.03	1.85	.....	2.28	.....	7.30

NOTE.—No ice reported by the observer. Relation of gage height to discharge probably not affected by ice during 1911.

NORTH FORK OF NEW RIVER NEAR CRUMPLER, N. C.

Location.—Seven-eighths of a mile above the confluence of North and South Forks of New River, and about 2½ miles north of Crumpler, N. C.

Records available.—August 13, 1908, to December 31, 1911.

Drainage area.—279 square miles.

Gage.—Staff gage attached to posts on right bank. The chain gage in use from August 13, 1908, was replaced by the present staff gage July 23, 1911. The staff gage is at the same location and reads to same datum as former chain gage.

Channel.—Practically permanent.

Discharge measurements.—Made from a boat at a section one-eighth mile below the gage, or by wading. The boat cable section was formerly at a ford one-fourth mile above gage, but was moved July 23, 1911, to a point one-eighth mile below gage.

Winter flow.—Flow little if at all affected by ice.

Accuracy.—The gage height record is considered very reliable. Sufficient data have not been obtained to permit estimates of discharge to be made.

The following discharge measurement was made by Horton and Bailey by wading near the old measuring-section about one-fourth mile above the gage:

July 23, 1911: Gage height, 1.42 feet; discharge, 159 second-feet.

Daily gage height, in feet, of North Fork of New River near Crumpler, N. C., for 1911.

[John J. Garvey, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.60	3.23	1.94	2.61	2.88	2.00	1.60	1.46	2.12	1.38	1.60	1.69
2	4.16	2.73	1.98	2.52	2.63	1.87	1.57	1.46	1.68	1.44	1.56	1.83
3	4.75	2.50	1.95	2.47	2.49	1.74	1.55	1.68	1.56	1.58	1.52	1.77
4	4.61	2.60	1.93	2.69	2.44	1.71	1.82	2.16	1.48	1.90	1.50	1.70
5	3.17	2.45	1.87	5.32	2.39	2.73	2.71	1.71	1.46	1.64	1.55	1.62
6	2.83	2.33	3.01	5.05	2.32	2.67	1.77	1.78	1.46	1.43	1.80	1.63
7	2.60	2.33	3.37	3.93	2.22	2.04	1.63	1.71	1.63	1.41	2.60	1.62
8	2.43	2.73	4.93	3.79	2.16	2.03	1.75	1.70	1.47	1.44	1.98	1.62
9	2.29	3.75	4.55	3.72	2.17	1.97	1.77	1.50	1.41	1.50	2.21	1.60
10	1.96	4.03	3.95	3.49	2.15	1.83	1.91	1.39	1.40	1.49	2.14	1.61
11	2.07	3.31	3.47	3.18	2.09	1.83	2.09	1.36	1.76	1.96	2.02	1.64
12	2.09	3.01	3.11	3.17	2.06	1.79	1.91	1.32	1.96	1.68	2.00	1.66
13	2.09	2.76	2.85	3.25	2.58	1.77	1.86	1.73	1.62	1.55	2.24	1.61
14	2.06	2.55	2.87	3.33	3.28	1.75	1.97	1.48	1.52	1.50	1.99	1.60
15	2.03	2.46	2.61	3.61	2.57	1.69	1.67	1.40	1.46	1.76	1.97	1.74
16	1.97	4.33	2.46	3.56	2.35	1.64	1.61	1.49	1.49	1.64	1.88	2.16
17	1.89	2.25	2.39	3.23	2.23	1.65	1.57	1.43	1.48	3.41	1.82	2.12
18	1.95	2.21	2.37	2.95	2.17	1.67	1.56	1.38	1.54	3.71	1.91	1.84
19	1.93	2.19	2.40	3.89	2.18	1.69	1.51	1.43	1.45	2.55	2.06	1.76
20	1.91	2.29	2.59	3.43	2.09	2.02	1.51	1.40	1.43	2.14	1.96	1.71
21	2.05	2.20	2.28	3.03	2.07	1.77	1.55	1.35	2.02	1.98	1.95	2.00
22	2.19	2.03	2.21	2.95	1.99	1.67	1.55	1.30	2.00	2.02	1.87	2.43
23	3.01	2.18	2.34	2.73	1.99	1.61	1.46	1.27	1.68	2.20	1.84	3.29
24	2.65	2.09	2.21	2.59	2.11	1.75	1.40	1.28	1.52	1.86	1.94	2.78
25	2.46	2.01	2.19	2.49	1.95	1.68	1.52	1.28	1.50	1.78	1.92	2.88
26	2.45	1.99	2.21	2.45	1.91	1.64	1.46	1.34	1.50	1.73	1.86	2.73
27	2.46	2.01	3.17	2.37	1.85	2.29	1.38	1.56	1.48	1.70	1.88	3.00
28	2.59	1.96	2.71	2.31	1.83	2.31	1.36	1.47	1.44	1.68	1.92	2.70
29	2.65	.....	2.65	2.35	1.79	1.94	1.35	1.66	1.46	1.66	1.92	2.51
30	4.05	.....	2.78	2.43	1.74	1.69	1.33	1.95	1.45	1.63	1.75	2.39
31	3.70	.....	2.66	.....	1.87	.....	1.36	3.09	.....	1.60	.....	2.64

NOTE.—Slush ice reported Feb. 23. Relation of gage height to discharge probably not affected by ice during 1911.

REED CREEK AT GRAHAMS FORGE, VA.

Location.—At highway bridge at Grahams Forge, Va.

Records available.—July 29, 1908, to December 31, 1911.

Drainage area.—247 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged since established.

Channel.—Practically permanent; bottom solid rock.

Discharge measurements.—Made from downstream side of bridge.

Point of zero flow.—A determination by leveling July 20, 1911, indicates that there would be no flow past the gage if the river stage were to fall to 0.6 foot ±0.1 foot, by the gage datum. Point of control is permanent.

Winter flow.—Relation of gage height to discharge is sometimes affected by ice for short periods.

Artificial control.—There is a dam and grist mill just above the station. The storage is small and the miller states that water flows over the dam at all times. The flow is therefore little if at all modified by the operation of the dam.

Accuracy.—The gage height record is considered accurate and reliable. Sufficient data have not been obtained to permit estimates of discharge to be made.

The following discharge measurement was made by Horton and Bailey July 20, 1911: Gage height, 2.16 feet; discharge, 106 second-feet.

Daily gage height, in feet, of Reed Creek at Grahams Forge, Va., for 1911.

[Munsey Runion and J. T. Black, observers.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.42	3.20	2.43	2.72	2.65	2.32	2.12	2.04	2.65	2.00	2.30	2.19
2	3.38	3.97	2.42	2.72	2.60	2.26	2.13	2.04	2.31	2.23	2.23	2.16
3	3.71	2.84	2.40	2.74	2.55	2.24	2.08	2.00	2.26	2.96	2.25	2.20
4	3.42	2.74	2.40	3.60	2.52	2.21	2.09	2.08	2.16	2.43	2.18	2.22
5	2.83	2.72	2.38	4.14	2.51	2.20	2.08	2.36	2.12	2.28	2.13	2.18
6	2.62	2.64	2.39	4.08	2.48	2.24	2.15	2.20	2.18	2.16	2.35	2.10
7	2.52	2.58	3.26	3.64	2.46	2.20	2.12	2.16	2.16	2.14	2.64	2.25
8	2.48	2.60	3.20	3.46	2.44	2.28	2.14	2.20	2.14	2.14	2.50	2.14
9	2.41	3.88	3.31	3.57	2.44	2.20	2.18	2.20	2.16	2.12	2.57	2.12
10	2.30	4.20	3.82	3.50	2.42	2.21	2.18	2.16	2.12	2.19	2.71	2.10
11	2.30	3.40	3.55	3.30	2.44	2.18	2.16	2.08	2.18	2.26	2.60	2.24
12	2.30	3.32	3.18	3.08	2.39	2.16	2.42	2.02	2.16	2.28	2.56	2.11
13	2.30	2.94	3.02	3.02	2.38	2.18	2.24	2.52	2.16	2.24	2.52	2.20
14	2.30	2.84	2.86	3.04	2.59	2.18	2.22	2.32	2.13	2.22	2.50	2.17
15	2.28	2.76	2.84	3.37	2.50	2.15	2.17	2.22	2.06	2.14	2.45	2.28
16	2.28	2.69	2.80	3.55	2.46	2.16	2.14	2.16	2.00	2.14	2.40	2.22
17	2.26	2.61	2.72	3.24	2.43	2.16	2.14	2.18	2.14	2.32	2.38	2.32
18	2.26	2.57	2.68	3.07	2.42	2.18	2.10	2.20	2.03	4.66	2.39	2.32
19	2.26	2.59	2.68	2.98	2.38	2.19	2.10	2.12	1.99	3.10	2.40	2.30
20	2.12	2.66	2.72	3.14	2.34	2.32	2.11	2.10	2.14	2.76	2.40	2.31
21	2.26	2.70	2.70	3.20	2.32	2.28	1.88	2.06	2.04	2.60	2.37	2.33
22	2.62	2.65	2.66	3.06	2.31	2.18	2.04	2.05	2.26	2.52	2.36	2.38
23	3.54	2.66	2.64	2.94	2.28	2.20	2.04	2.00	2.28	2.50	2.34	3.56
24	3.24	2.58	2.58	2.83	2.28	2.16	2.02	2.05	2.16	2.46	2.34	3.05
25	2.80	2.54	2.55	2.76	2.26	2.14	2.02	2.14	2.12	2.43	2.33	3.10
26	2.68	2.50	2.50	2.72	2.26	2.16	2.03	2.20	2.12	2.38	2.29	2.99
27	2.60	2.48	2.76	2.66	2.26	2.16	2.02	2.42	2.04	2.36	2.29	3.00
28	2.59	2.46	2.86	2.62	2.24	2.18	2.03	2.24	2.03	2.30	2.26	2.92
29	2.67	.....	2.77	2.60	2.20	2.16	2.02	2.18	2.04	2.32	2.31	2.72
30	4.52	.....	2.77	2.61	2.23	2.16	2.05	2.30	1.99	2.29	2.22	2.68
31	3.62	.....	2.74	.....	2.22	.....	2.00	2.60	.....	2.30	.....	2.70

NOTE.—No ice reported. Relation of gage height to discharge probably not affected by ice.

BIG REED ISLAND CREEK NEAR ALLISONIA, VA.

Location.—Twelve hundred feet above a suspension footbridge at J. P. Thomas's farm, 1½ miles from Allisonia, Va., and half a mile above mouth of Little Reed Island Creek.

Records available.—July 31, 1908, to December 31, 1911.

Drainage area.—291 square miles.

Gage.—Vertical staff gage fastened to a tree on right bank; datum unchanged since established.

Channel.—The channel is liable to change caused by deposits of silt from ore washing; the point of control below the gage is permanent and is unaffected by the silt.

Discharge measurements.—Made from downstream side of suspension footbridge 1,200 feet below gage, or by wading under bridge.

Point of zero flow.—A determination of leveling July 19, 1911, indicates that there would be no flow past the gage if the river stage were to fall to −0.7 foot ±0.2 foot.

Winter flow.—The relation of gage height to discharge is sometimes, though not frequently, affected by ice in winter.

Accuracy.—Records of gage height are considered reliable. Sufficient data have not been obtained to permit estimates of discharge to be made.

The following discharge measurement was made by Horton and Bailey:
July 19, 1911: Gage height, 0.40 foot; discharge, 172 second-feet.

Daily gage height, in feet, of Big Reed Island Creek near Allisonia, Va., for 1911.

[K. M. Thomas, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	0.75	0.6	0.65	0.9	0.7	0.5	0.3	0.7	0.3	0.5	0.56
2	1.5	.65	.6	.6	.85	.6	.4	.3	.55	.4	.5	.54
3	1.6	.6	.6	.6	.7	.5	.4	.3	.55	.6	.4	.54
4	1.6	.6	.6	.65	.7	.5	.4	.3	.4	.5	.4	.52
5	.95	.6	.6	1.85	.65	.6	.95	.5	.4	.4	.4	.43
6	.8	.7	.65	1.75	.6	.65	.55	1.05	.35	.4	.55	.44
7	.8	.7	.8	1.1	.6	.75	.5	.55	.3	.4	.95	[a].56
8	.7	.8	.8	1.65	.6	1.05	1.05	.4	.3	.5	.6	.48
9	.7	1.2	1.15	1.25	.6	.65	.65	.4	.4	.5	.6	.46
10	.7	1.2	1.0	1.05	.6	.55	.55	.35	.55	.4	.65	.47
11	[c].7	.95	1.0	.9	.6	.5	.5	.3	.5	.5	.6	.48
12	.7	.8	.85	.95	.6	.5	.5	.4	.5	.5	.56	.50
13	.6	.7	.75	1.0	.75	.5	.6	.6	.4	.4	1.05	.48
14	.6	.7	.8	1.25	1.7	.5	.65	.55	.3	.4	.66	.48
15	.6	.7	.8	1.45	.95	.5	.55	.4	.3	.4	.53	.56
16	.6	.7	.7	1.4	.8	.5	.4	.4	.3	.4	.58	1.2
17	.6	.7	.6	1.05	.7	.5	.4	.35	.3	.5	.54	1.1
18	.6	.7	.65	.9	.7	.5	.4	.3	.35	[b] 2.4	.54	.76
19	.6	.7	.7	.95	.6	.5	.4	.3	.3	.85	.56	.66
20	.6	.7	.75	1.05	.6	.5	.4	.3	.3	.65	.60	.60
21	.6	[c].7	.65	.9	.6	.5	.4	.3	.35	.6	.54	.66
22	.75	.7	.6	.8	.6	.4	.4	.3	.9	.55	.51	.94
23	.95	.6	.6	.8	.65	.4	.4	.3	.65	.85	.50	1.6
24	.75	.6	.6	.8	.6	.4	.3	.3	.5	.6	.54	.98
25	.7	.6	.6	.8	.6	.5	.35	.3	.4	.5	.62	1.2
26	.7	.6	.6	.7	.6	.5	.35	.65	.4	.5	.50	.94
27	.7	.6	.85	.7	.55	.6	.3	1.35	.4	.5	.50	1.0
28	.6	.6	.75	.7	.6	1.1	.3	.5	.4	.5	.52	.85
29	.6	.....	.7	.7	.55	.7	.3	.55	.4	.5	.72	.80
30	1.0	.....	.7	.8	.5	.55	.3	1.15	.35	.5	.66	.72
31	1.0	.....	.7	.....	.75	.....	.3	.9	.....	.5	.....	.....

[a] Observer reported "backwater." [b] Gage height 3.3 feet at 7 a. m. Oct. 18. [c] Slush ice running.

LITTLE RIVER NEAR COPPER VALLEY, VA.

Location.—At highway bridge about 5 miles south of Childress and half a mile north of Copper Valley, Va., and 600 feet above the mouth of Indian Creek.

Records available.—July 25, 1908, to December 31, 1911.

Drainage area.—195 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged since established.

Channel.—Regular and practically permanent.

Discharge measurements.—Made from downstream side of bridge.

Point of zero flow.—A determination by leveling, July 18, 1911. indicates that there would be no flow past the gage if the river stage were to fall to 1.8 feet, ±0.2 foot. Control probably permanent.

Winter flow.—The discharge is affected by ice for short periods in the winter.

Accuracy.—Records of gage height are considered reliable. Sufficient data have not been obtained to permit estimates of discharge to be made.

The following discharge measurement was made by Horton and Bailey:

July 18, 1911: Gage height, 3.25 feet; discharge, 125 second-feet.

Daily gage height, in feet, of Little River near Copper Valley, Va., for 1911.

[T. A. De Hart, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.57	3.70	3.39	3.44	3.82	3.98	3.24	3.15	3.96	3.15	3.29	3.29
2	3.75	3.63	3.41	3.39	3.64	3.44	3.25	3.15	3.45	3.35	3.29	3.45
3	4.63	3.57	3.40	3.54	3.54	3.35	3.24	3.15	3.31	3.70	3.21	3.52
4	4.37	3.54	3.35	3.86	3.52	3.32	3.29	3.11	3.25	3.35	3.25	3.30
5	3.83	3.55	3.34	5.80	3.52	3.36	3.77	3.30	3.25	3.28	3.25	3.30
6	3.55	3.45	3.51	4.94	3.52	3.59	3.46	3.88	3.25	3.20	3.47	3.52
7	3.85	3.47	3.65	4.19	3.46	3.68	3.39	3.38	3.26	3.16	3.79	3.38
8	3.67	3.43	3.60	4.74	3.48	4.00	4.39	3.32	3.20	3.24	3.48	3.52
9	3.53	4.07	3.63	4.44	3.50	3.56	3.56	3.38	3.20	3.31	3.46	3.30
10	3.55	4.13	4.36	4.04	3.48	3.40	3.46	3.18	3.44	3.31	3.60	3.29
11	3.69	3.77	4.20	3.89	3.45	3.35	3.36	3.08	3.40	3.31	3.42	3.28
12	3.55	3.70	3.87	3.90	3.44	3.36	3.34	3.11	3.32	3.34	3.41	3.29
13	3.49	3.65	3.75	4.19	3.56	3.33	3.30	3.48	3.28	3.21	3.61	3.28
14	3.45	3.55	3.85	4.32	4.02	3.29	3.70	3.38	3.20	3.20	3.46	3.25
15	3.43	3.54	3.80	4.46	3.52	3.28	3.36	3.25	3.21	3.19	3.39	3.34
16	3.37	3.53	3.60	4.42	3.45	3.24	3.26	3.15	3.20	3.18	3.36	4.30
17	3.37	3.49	3.47	4.04	3.44	3.08	3.20	3.14	3.20	3.28	3.35	4.08
18	3.39	3.46	3.59	3.92	3.45	3.19	3.22	3.15	3.20	5.72	3.41	3.80
19	3.45	3.53	3.57	3.89	3.40	3.49	3.20	3.18	3.20	4.10	3.38	3.46
20	3.44	3.65	3.75	4.04	3.39	3.52	3.18	3.16	3.18	3.55	3.38	3.39
21	3.45	3.60	3.53	4.32	3.36	3.38	3.20	3.10	3.22	3.42	3.36	3.42
22	3.63	3.70	3.46	3.74	3.33	3.32	3.19	3.10	3.70	3.38	3.32	3.60
23	4.01	3.56	3.43	3.66	3.42	3.25	3.20	3.08	3.62	3.62	3.31	4.59
24	3.65	3.51	3.37	3.68	3.39	3.28	3.18	3.08	3.29	3.46	3.36	3.99
25	3.53	3.44	3.35	3.64	3.36	3.94	3.16	3.09	3.21	3.38	3.38	4.28
26	3.55	3.40	3.37	3.64	3.28	3.94	3.16	3.30	3.25	3.34	3.32	3.95
27	3.53	3.36	3.63	3.60	3.32	3.56	3.15	3.50	3.21	3.34	3.32	3.88
28	3.53	3.40	3.53	3.59	3.34	3.69	3.14	3.36	3.16	3.28	3.35	3.65
29	3.46	.....	3.43	3.66	3.33	3.50	3.16	3.30	3.18	3.25	3.45	3.38
30	4.37	.....	3.75	3.79	3.29	3.32	3.15	3.95	3.15	3.22	3.35	3.68
31	3.99	.....	3.51	.....	3.38	.....	3.14	3.98	.....	3.22	.....	3.75

NOTE.—Observer made no report concerning ice. Relation of gage height to discharge probably not affected by ice during 1911.

WALKER CREEK AT STAFFORDSVILLE, VA.

Location.—At highway bridge at Staffordsville, Va., 500 feet below the mouth of Whitley Creek.

Records available.—July 24, 1908, to December 31, 1911.

Drainage area.—277 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged since established.

Channel.—Rocky; practically permanent.

Discharge measurements.—Made from downstream side of bridge.

Winter flow.—Relation of gage height to discharge not affected by ice.

Artificial control.—A dam and power plant 300 feet above the station may affect the flow at low water.

Accuracy.—Gage height record is considered reliable. Sufficient data have not been collected to permit estimates of discharge to be made.

The following discharge measurement was made by Horton and Bailey:

July 16, 1911: Gage height, 3.34 feet; discharge, 136 second-feet.

Daily gage height, in feet, of Walker Creek at Staffordsville, Va., for 1911.

[J. F. Durham, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.90	4.98	3.51	4.16	3.90	3.54	3.22	2.90	3.54	2.80	3.30	3.24
2	5.76	4.60	3.52	4.06	3.84	3.42	3.13	2.86	3.38	3.06	3.22	3.24
3	6.62	4.36	3.48	4.14	3.72	3.28	3.07	2.88	3.22	4.27	3.20	3.26
4	5.82	4.18	3.44	5.65	3.68	3.19	3.22	2.89	3.10	3.72	3.20	3.21
5	4.70	4.05	3.40	6.24	3.60	3.20	3.26	3.19	3.02	3.43	3.20	3.20
6	4.26	3.90	3.92	6.10	3.60	3.16	3.22	3.17	3.10	3.28	3.35	3.15
7	3.95	3.84	5.38	5.52	3.54	3.16	3.20	3.02	3.08	3.20	3.92	3.18
8	3.92	3.94	4.95	5.70	3.54	3.18	3.56	3.10	3.06	3.20	3.86	3.16
9	3.70	5.62	5.30	5.85	3.55	3.20	3.22	2.98	3.00	3.18	3.94	3.16
10	3.52	6.35	6.90	5.46	3.53	3.12	3.12	2.94	2.96	3.26	4.06	3.17
11	3.46	5.22	6.38	5.07	3.50	3.05	3.34	2.88	3.00	3.56	3.93	3.19
12	3.49	4.76	5.36	4.90	3.50	3.04	3.30	2.88	3.02	3.57	3.82	3.13
13	3.40	4.42	5.05	4.82	3.44	3.00	3.38	3.12	3.07	3.44	3.82	3.18
14	3.42	4.28	5.37	5.06	3.42	3.00	3.48	3.52	2.99	3.32	3.80	3.14
15	3.38	4.10	5.07	5.45	3.40	3.00	3.48	3.20	2.96	3.24	3.78	3.18
16	3.30	3.95	4.71	5.62	3.36	2.98	3.30	3.08	2.98	3.20	3.70	3.32
17	3.32	3.82	4.42	5.22	3.34	2.94	3.24	2.95	2.94	3.98	3.65	3.42
18	3.34	3.74	4.26	4.85	3.32	3.03	3.14	2.94	2.96	7.95	3.59	3.40
19	3.30	3.74	4.22	4.64	3.32	3.10	3.10	2.92	2.95	5.44	3.68	3.32
20	3.26	3.88	4.30	4.76	3.30	3.58	3.04	2.85	2.93	4.52	3.64	3.30
21	3.32	3.98	4.21	4.80	3.25	3.68	3.00	2.90	2.90	4.12	3.61	3.30
22	3.56	3.82	4.08	4.70	3.26	3.28	3.06	2.85	2.96	3.94	3.58	3.45
23	4.90	3.88	4.01	4.50	3.22	3.18	2.95	2.78	3.10	3.90	3.51	5.92
24	4.46	3.77	3.90	4.30	3.22	3.19	2.90	2.84	3.10	3.76	3.50	4.96
25	4.15	3.72	3.81	4.16	3.20	3.16	2.84	2.86	2.99	3.61	3.46	5.01
26	4.02	3.68	3.74	4.04	3.16	3.26	2.84	2.90	2.94	3.55	3.42	4.73
27	4.00	3.63	4.73	3.94	3.16	3.19	2.82	2.87	2.92	3.50	3.40	4.76
28	3.93	3.58	4.73	3.89	3.18	3.27	2.82	3.26	2.88	3.47	3.39	4.48
29	3.92	.....	4.50	3.84	3.13	3.60	2.92	3.08	2.90	3.40	3.30	4.25
30	6.06	.....	4.48	3.84	3.09	3.36	2.82	3.20	2.91	3.36	3.29	4.10
31	5.75	.....	4.31	.....	3.14	.....	2.78	3.56	.....	3.33	.....	4.11

NOTE.—Relation of gage height to discharge probably not affected by ice during 1911.

WOLF CREEK NEAR NARROWS, VA.

Location.—At highway bridge 3 miles above Narrows, Va., 1,500 feet below the New River, Holston & Western Railroad bridge, and 2½ miles above mouth of Mill Creek.

Records available.—July 22, 1908, to December 31, 1911.

Drainage area.—223 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged since established.

Channel.—Rocky, practically permanent.

Discharge measurements.—Made from downstream side of bridge.

Point of zero flow.—A determination of leveling July 15, 1911, indicates that there would be no flow past the gage if the river stage were to fall to 1.1 feet to ±0.2 foot.

Winter flow.—Relation of gage height to discharge not affected by ice except for short periods during extremely cold weather.

Accuracy.—Records of gage height are considered reliable. Sufficient data have not been obtained to permit estimates of discharge to be made.

The following discharge measurement was made by Horton and Bailey:

July 15, 1911: Gage height, 2.69 feet; discharge, 71 second-feet.

Daily gage height, in feet, of Wolf Creek near Narrows, Va., for 1911.

[J. A. Hale, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.78	4.65	3.19	3.69	3.48	2.88	2.74	2.44	2.64	2.48	2.89	3.04
2	5.40	4.28	3.17	3.63	3.40	2.84	2.62	2.45	2.62	3.18	2.84	3.02
3	5.58	4.02	3.13	3.68	3.31	2.75	2.62	2.45	2.56	4.86	2.80	3.00
4	5.05	4.94	3.08	5.14	3.25	2.70	2.68	2.48	2.52	3.72	2.79	3.00
5	4.26	3.83	3.03	5.67	3.22	2.70	2.69	2.64	2.54	3.36	2.78	2.94
6	3.92	3.68	3.79	5.60	3.20	2.70	2.65	2.66	2.59	3.08	2.86	2.90
7	3.62	3.60	4.96	5.02	3.18	2.72	2.62	2.54	2.63	3.04	3.29	2.90
8	3.52	3.76	4.86	5.00	3.15	2.69	2.64	2.58	2.63	3.03	3.28	2.88
9	3.41	5.35	4.70	5.10	3.13	2.64	2.68	2.56	2.58	3.00	3.22	2.86
10	3.28	5.90	6.52	4.86	3.12	2.62	2.92	2.50	2.52	2.96	3.20	2.81
11	3.15	4.95	5.30	4.48	3.09	2.60	2.86	2.46	2.51	3.34	3.18	2.80
12	3.10	4.40	4.66	4.31	3.06	2.60	2.83	2.44	2.66	3.38	3.16	2.80
13	3.09	4.04	4.32	4.15	3.01	2.60	2.86	2.60	2.68	3.22	3.38	2.79
14	3.04	3.88	4.32	4.02	3.00	2.60	2.75	2.79	2.60	3.12	3.37	2.80
15	3.01	3.70	4.10	4.30	2 98	2.56	2.71	2.64	2.56	3.03	3.34	2.80
16	2.96	3.56	3.95	4.61	2.96	2.59	2.66	2.58	2.54	3.00	3.26	2.86
17	2.95	3.42	3.80	4.40	2.93	2.58	2.62	2.54	2.61	3.12	3.18	2.92
18	2.99	3.36	3.71	4.16	2.92	2.61	2.59	2.56	2.60	6.88	3.32	2.91
19	2.96	3.37	3.65	4.03	2.91	2.66	2.56	2.66	2.56	4.68	3.82	2.87
20	2.94	3.60	3.82	4.28	2.89	3.16	2.51	2.55	2.54	4.06	3.66	2.84
21	2.99	3.63	3.75	4.53	2.86	2.81	2.53	2.54	2.54	3.72	3.52	2.84
22	3.31	3.51	3.72	4.39	2.82	2.70	2.51	2.50	2.60	3.51	3.38	2.92
23	3.78	3.52	3.72	4.16	2.80	2.62	2.50	2.44	2.97	3.46	3.28	4.68
24	3.70	3.42	3.54	3.95	2.83	2.58	2.48	2.45	2.78	3.33	3.20	4.19
25	3.56	3.38	3.44	3.80	2.79	2.74	2.47	2.44	2.68	3.22	3.28	4.32
26	3.49	3.34	3.41	3.68	2.74	2.72	2.46	2.50	2.62	3.13	3.20	4.16
27	3.60	3.29	3.98	3.59	2.76	2.66	2.46	2.48	2.59	3.08	3.16	4.19
28	3.62	3.23	3.98	3.49	2.71	3.16	2.45	2.54	2.58	3.04	3.18	4.04
29	3.68	.....	3.92	3.43	2.69	3.06	2.44	2.50	2.54	2.99	3.16	3.82
30	5.85	.....	3.87	3.41	2.64	2.85	2.46	2.58	2.51	2.96	3.12	3.71
31	5.40	.....	3.76	.....	2.70	.....	2.46	2.64	.....	2.92	.....	3.72

NOTE.—Relation of gage height to discharge probably not affected by ice during 1911.

BLUESTONE RIVER AT LILLY, W. VA.

Location.—At Lilly, W. Va., 2,000 feet below the mouth of Little Bluestone River.
Records available.—August 22, 1908, to December 31, 1911.
Drainage area.—454 square miles.
Gage.—Vertical staff gage in two sections; datum unchanged since established.
Channel.—Practically permanent.
Discharge measurements.—Made from a boat 150 feet above gage, or by wading.
Point of zero flow.—Levels taken August 24, 1910, indicate that there would be no flow past the gage if the river stage were to fall to 0.0±0.2 feet.
Winter flow.—During portions of December, January, and February, the flow is at times affected by ice.
Accuracy.—See footnotes to table of daily gage height.

Discharge measurements of Bluestone River at Lilly, W. Va., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
July 13	Horton and Bailey	1.92	218
Oct. 18	Bailey and Perwien	5.90	4,460
20	.....do	2.98	786

NOTE.—Measurements not made at the regular measuring section.

Daily gage height, in feet, of Bluestone River at Lilly, W. Va., for 1911.

[W. H. Lilly, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.15	4.65	2.04	2.62	2.85	1.32	1.42	0.99	1.22	0.97	1.56	2.20
2	5.50	4.20	2.05	2.66	2.68	1.40	1.41	.94	1.18	2.60	1.49	2.25
3	4.90	3.12	2.22	4.00	2.66	1.44	1.39	.89	1.15	5.20	1.39	2.00
4	4.20	2.85	2.28	5.55	2.64	1.36	1.44	.92	1.11	4.20	1.32	2.00
5	3.75	2.68	2.35	5.00	2.66	1.45	2.15	.98	1.08	2.40	1.22	1.80
6	2.70	2.65	2.45	4.95	2.45	1.38	1.95	.99	1.02	3.55	2.50	1.75
7	2.40	2.59	6.35	4.50	2.29	1.46	2.20	.96	.92	2.90	3.75	1.70
8	2.25	2.88	6.20	4.20	2.00	1.52	2.55	.97	.95	2.25	3.58	1.72
9	2.12	4.45	5.65	5.05	1.99	1.46	2.15	.94	1.06	2.42	3.45	1.64
10	1.95	5.55	4.80	4.85	1.96	1.42	2.12	.96	1.10	2.55	3.34	1.61
11	1.82	3.95	4.55	3.62	1.92	1.32	2.04	1.02	1.06	2.30	2.35	1.60
12	1.92	3.10	3.85	2.95	1.79	1.18	1.89	1.01	1.02	2.80	2.14	1.60
13	1.88	2.84	3.20	2.85	1.62	1.07	1.86	1.09	.96	2.85	2.20	1.65
14	1.90	2.62	2.95	3.10	1.60	1.06	1.57	1.02	.89	2.60	2.25	1.64
15	1.85	2.48	2.82	3.90	1.64	1.01	1.42	.96	.89	2.20	2.12	1.63
16	1.82	2.25	2.60	4.32	1.52	1.02	1.40	.94	1.02	2.02	2.12	1.88
17	1.92	2.20	2.42	4.10	1.44	1.04	1.32	.90	.96	2.39	2.19	1.88
18	1.86	2.35	2.55	3.85	1.40	1.09	1.22	.94	1.02	5.70	2.16	1.86
19	1.78	3.00	3.25	3.72	1.40	1.18	1.19	.95	1.22	3.95	3.70	1.85
20	1.82	3.15	3.90	3.95	1.42	1.09	1.12	.96	1.22	2.79	3.95	1.80
21	1.95	3.05	3.45	4.20	1.44	1.16	1.15	.92	1.12	2.48	3.25	1.80
22	2.45	2.99	3.25	3.70	1.49	1.20	1.14	.92	1.18	2.30	2.37	1.82
23	2.82	2.87	2.95	3.05	1.54	1.26	1.09	.96	1.05	2.22	2.32	4.55
24	2.68	2.25	2.75	2.98	1.52	1.25	1.00	.99	1.02	2.16	3.34	3.66
25	2.45	2.32	2.70	2.78	1.42	1.65	.96	.95	.92	2.10	3.36	3.66
26	2.35	2.32	2.58	2.65	1.49	1.85	.97	.93	.96	2.06	3.05	3.45
27	2.44	2.30	2.42	2.48	1.51	1.59	.97	.89	.91	2.00	2.32	3.40
28	2.40	2.45	2.52	2.42	1.42	1.52	.96	.93	.92	1.86	2.19	3.00
29	2.55	.....	2.55	2.34	1.25	1.56	.94	1.10	.96	1.79	2.25	2.80
30	6.55	.....	2.66	2.85	1.30	1.49	.96	1.25	.94	1.72	2.27	3.00
31	5.05	.....	2.62	.....	1.45	.....	.96	1.32	.....	1.55	.....	2.90

NOTE.—From a hydrograph comparison between the gage heights observed at Lilly and True, it is believed that the observer at Lilly recorded his observations 1 foot too high Nov. 8 (p. m.) to Nov. 10 (p. m.), Nov. 20 (a. m.) to Nov. 21 (p. m.), and Nov. 24 (a. m.) to Nov. 26 (a. m.). Daily gage heights published above are the means of two observations each day as originally recorded and are believed to be ½ foot too high Nov. 8 and 26, and 1 foot too high Nov. 9, 10, 20, 21, 24, and 25. In computing daily discharge for dates noted above, corrections to gage heights will be applied before entering the discharge rating table, as indicated by the hydrograph comparison.

Observer made no report concerning ice. Relation of gage height to discharge probably affected by ice during January and February, but not during December.

BLUESTONE RIVER NEAR TRUE, W. VA.

Location.—At Barker's ford, 1 mile above the mouth of the river and three-fourths of a mile above True post office.

Records available.—October 17, 1911, to December 31, 1911.

Gage.—Staff gage in two sections, on right side of river.

Channel.—Practically permanent.

Discharge measurements.—Made from a boat 20 feet below gage or by wading.

Winter flow.—The relation of gage height to discharge may be affected by ice for short periods during December, January, and February.

Accuracy.—Gage-height record is considered reliable. Sufficient data have not been obtained to permit estimates of discharge to be made.

Discharge measurements of Bluestone River near True, W. Va., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Oct. 19	Bailey and Perwien	4.45	2,240
20	.....do	2.90	693

NOTE.—Measurements made at gage, 20 feet above regular gaging section.

Daily gage height, in feet, of Bluestone River near True, W. Va., for 1911.

[Arthur Barker, observer.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1	.....	1.88	2.20	11	.....	2.06	1.90	21	2.50	2.65	1.96
2	.....	1.82	2.16	12	.....	2.08	1.89	22	2.40	2.41	2.13
3	.....	1.80	2.12	13	.....	2.15	1.86	23	2.40	2.28	4.74
4	.....	1.80	2.08	14	.....	2.48	1.88	24	2.30	2.27	3.78
5	.....	1.79	2.05	15	.....	2.28	1.92	25	2.17	2.34	3.78
6	.....	2.62	1.94	16	.....	.....	1.94	26	2.10	2.44	3.65
7	.....	3.60	1.97	17	5.00	2.16	1.99	27	2.02	2.44	4.05
8	.....	2.99	1.99	18	5.88	2.21	2.04	28	2.01	2.40	3.50
9	.....	2.52	1.95	19	4.17	3.92	2.01	29	1.97	2.42	4.02
10	.....	2.32	1.91	20	3.02	3.08	1.99	30	1.90	2.31	3.20
								31	1.87	.....	2.84

NOTE.—Observer made no report concerning ice. Relation of gage height to discharge probably not affected by ice during 1911.

GREENBRIER RIVER NEAR MARLINTON, W. VA.

Location.—At Chesapeake & Ohio Railway bridge on the switch that runs to Campbell's lumber mill, 1½ miles above Marlinton, W. Va., and immediately below the mouth of Stoney Creek.

Records available.—July 9, 1908, to December 31, 1911.

Drainage area.—408 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged since established.

Channel.—Coarse gravel, practically permanent.

Discharge measurements.—Made from downstream side of bridge.

Point of zero flow.—A determination by leveling August 22, 1910, indicates that there would be no flow past the gage if the river stage were to fall to 2.25 feet ± 0.2 foot.

Winter flow.—Relation of gage height to discharge may be affected by ice for short periods during December, January, and February.

Accuracy.—Sufficient data have not been obtained to permit estimates of discharge to be made.

The following discharge measurement was made by Bailey and Perwien:

November 3, 1911: Gage height, 3.75 feet; discharge, 210 second-feet.

Daily gage height, in feet, of Greenbrier River near Marlinton, W. Va., for 1911.

[P. G. Johnston, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.28	6.98	4.31	4.78	4.24	4.20	3.50	3.20	4.92	4.70	3.82	.....
2	6.76	6.39	4.39	4.65	4.16	3.92	3.46	3.19	4.45	4.66	3.73	.....
3	9.07	5.81	4.32	4.50	4.10	3.68	3.43	3.24	4.11	4.64	3.64	.....
4	7.91	5.30	4.22	6.06	4.04	3.57	3.39	3.24	3.82	4.60	3.54	.....
5	6.40	4.97	4.14	7.63	3.97	3.82	3.36	3.38	3.66	4.55	3.46	.....
6	5.52	4.83	4.06	7.02	3.92	4.23	3.68	3.47	3.56	4.50	3.80	.....
7	4.88	4.72	4.36	5.96	3.88	4.16	3.98	3.42	3.50	4.84	5.08	.....
8	4.55	4.62	4.78	5.50	3.85	4.72	3.94	3.34	3.44	5.24	5.17	.....
9	4.34	4.57	4.76	5.22	3.81	4.33	3.91	3.30	3.37	5.33	4.97	.....
10	4.20	4.66	5.55	4.98	3.78	4.10	3.88	3.26	3.43	5.18	4.76	.....
11	5.68	4.60	5.86	4.80	3.72	3.97	3.83	3.24	3.42	5.02	4.62	.....
12	6.90	4.51	5.72	4.64	3.66	4.05	3.73	3.23	3.38	4.88	.....	.....
13	7.36	4.44	5.66	5.30	3.60	4.10	3.61	3.22	3.33	4.60	.....	.....
14	6.90	4.36	5.60	6.58	3.58	3.97	3.51	3.21	3.26	4.34	.....	.....
15	5.96	4.29	5.54	6.47	3.57	3.81	3.44	3.20	3.62	4.36	.....	.....
16	5.58	4.22	5.64	6.18	3.56	3.72	3.36	3.20	5.76	5.04	.....	.....
17	5.20	4.15	5.76	5.96	3.56	3.63	3.37	3.19	5.72	5.95	.....	5.60
18	4.88	4.10	5.92	5.79	3.54	3.60	3.38	3.18	5.63	8.14	.....	5.78
19	4.60	4.04	6.12	5.57	3.53	3.86	3.38	3.17	5.54	6.88	4.83	6.20
20	4.37	3.95	6.04	5.36	3.52	3.76	3.37	3.17	5.42	5.64	4.76	5.97
21	4.32	4.00	5.64	5.18	3.50	3.86	3.37	3.16	5.30	5.21	4.70	5.76
22	5.42	4.28	5.22	5.04	3.48	3.82	3.36	3.16	5.18	5.03	4.60	5.67
23	5.96	4.46	5.06	4.94	3.48	3.76	3.35	3.15	5.06	4.86	4.49	5.93
24	5.86	4.42	4.94	4.85	3.47	3.73	3.34	3.15	4.94	4.66	4.41	5.78
25	5.60	4.36	4.81	4.74	3.46	3.69	3.36	3.14	4.83	4.48	4.34	5.61
26	5.72	4.32	4.76	4.62	3.58	3.66	3.35	3.14	4.76	4.38	.....	5.44
27	6.66	4.23	5.21	4.50	4.50	3.64	3.32	3.26	4.69	4.27	.....	5.28
28	6.91	4.16	5.42	4.44	4.52	3.60	3.28	3.98	4.64	4.17	.....	5.13
29	6.46	.....	5.20	4.39	4.90	3.55	3.25	4.92	4.58	4.08	.....	5.30
30	11.62	.....	5.07	4.31	4.67	3.52	3.22	5.42	4.53	4.00	.....	5.70
31	9.10	.....	4.93	.....	4.44	.....	3.20	5.43	.....	3.91	.....	6.67

NOTE.—Observer made no report concerning ice. Relation of gage height to discharge probably not affected by ice during 1911.

GREENBRIER RIVER AT ALDERSON, W. VA.

Location.—At highway bridge at Alderson, W. Va., half a mile above the mouth of Muddy Creek.

Records available.—August 1, 1895, to July 15, 1906; May 10, 1907, to December 31, 1911.

Drainage area.—1,340 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged since established.

Channel.—Permanent or nearly so; wide and shallow.

Discharge measurements.—Made from downstream side of bridge.

Floods.—No record of floods previous to installation of the gage. Maximum gage height since establishment of gage was 18.2 feet, November 26, 1900.

Winter flow.—The records are affected little if any by ice.

The following discharge measurement was made by Bailey and Perwein:
November 4, 1911: Gage height, 2.22 feet; discharge, 513 second-feet.

Daily gage height, in feet, of Greenbrier River at Alderson, W. Va., for 1911.

[W. J. Hancock, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.65	5.75	3.18	3.92	3.00	2.48	1.92	1.60	3.65	2.00	2.38	2.88
2	6.60	5.10	3.10	3.75	3.00	2.38	1.88	1.55	3.20	2.30	2.30	2.80
3	9.80	4.52	3.02	4.05	2.88	2.30	2.08	1.55	2.62	2.30	2.25	2.74
4	9.90	4.18	2.88	5.18	2.78	2.22	2.08	1.58	2.42	2.68	2.20	2.70
5	6.15	3.95	2.75	8.40	2.68	2.22	1.98	2.08	2.32	2.70	2.12	2.55
6	4.25	3.65	4.62	7.95	2.60	2.50	1.95	1.75	2.22	2.55	2.40	2.49
7	3.70	3.50	5.58	5.80	2.50	2.32	1.90	1.70	2.08	2.42	6.15	2.46
8	3.30	3.42	4.65	5.00	2.50	2.35	2.12	1.80	2.00	2.30	5.00	2.44
9	3.05	4.00	4.10	5.82	2.50	2.58	2.00	2.02	1.90	3.90	3.85	2.44
10	2.85	4.65	4.95	5.50	2.50	2.55	1.95	2.00	2.55	3.30	3.44	2.40
11	2.70	4.10	5.90	4.62	2.48	2.35	2.18	1.80	2.48	2.98	3.15	2.40
12	2.82	3.65	5.20	4.10	2.45	2.25	2.10	1.80	2.40	2.98	2.98	2.40
13	2.95	3.45	4.40	3.78	2.40	2.20	2.00	2.12	2.92	2.98	3.22	2.39
14	5.55	3.22	4.55	3.70	2.32	2.15	1.98	2.15	2.55	2.85	3.22	2.40
15	4.70	3.08	4.45	6.05	2.28	2.28	1.92	2.10	2.35	2.72	3.08	2.41
16	4.20	2.95	4.05	5.65	2.25	2.18	1.88	2.05	2.50	3.98	2.99	2.47
17	3.82	2.82	3.82	4.70	2.22	2.15	1.88	1.95	3.90	3.85	2.88	2.72
18	3.45	2.78	3.60	4.10	2.08	2.10	1.80	1.85	3.40	8.50	2.88	3.06
19	3.20	2.70	3.55	3.75	2.18	2.10	1.75	1.80	2.90	6.25	3.82	3.02
20	3.00	2.98	4.85	4.32	2.18	2.00	1.72	1.70	2.62	4.35	3.92	2.90
21	3.08	3.00	4.95	4.60	2.10	2.05	1.70	1.70	2.45	3.50	3.45	2.79
22	3.60	2.85	4.30	4.50	2.10	2.05	1.70	1.65	2.32	3.08	3.18	2.78
23	5.65	2.75	3.85	4.08	2.15	2.20	1.70	1.60	2.28	3.28	2.95	4.53
24	4.70	2.68	3.65	3.90	2.20	2.10	1.72	1.62	2.20	3.60	2.89	5.18
25	3.95	2.75	3.42	3.65	2.10	2.00	1.70	1.62	2.15	3.22	2.90	4.60
26	3.65	2.80	3.22	3.50	2.02	2.00	1.62	1.62	2.02	3.00	2.98	4.32
27	3.92	2.90	3.45	3.32	2.05	2.05	1.60	1.68	1.95	2.85	2.90	4.63
28	4.60	3.00	4.40	3.15	2.00	2.15	1.60	1.60	2.00	2.72	2.88	5.01
29	5.05	.....	4.05	3.02	2.22	2.10	1.65	1.65	2.00	2.58	2.86	4.22
30	12.90	.....	3.90	3.00	2.50	2.00	1.65	1.68	2.08	2.48	2.90	3.76
31	8.85	.....	4.00	.....	2.60	.....	1.60	1.85	.....	2.40	.....	3.85

NOTE.—No ice reported by observer. Relation of gage height to discharge probably not affected by ice.

Daily discharge, in second-feet, of Greenbrier River at Alderson, W. Va., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5,690	9,100	2,140	3,850	1,720	828	260	101	3,220	315	696	1,480
2	11,600	7,080	1,920	3,480	1,720	696	234	86	2,140	598	598	1,330
3	23,000	5,420	1,720	4,100	1,480	598	380	86	1,030	598	544	1,230
4	23,100	4,620	1,480	7,360	1,300	512	380	95	747	1,130	490	1,160
5	10,300	3,980	1,240	17,800	1,130	512	301	380	622	1,160	415	928
6	4,620	3,220	5,690	16,400	1,000	855	280	164	512	928	720	842
7	3,350	2,860	8,520	9,100	855	622	246	140	380	747	10,300	801
8	2,380	2,620	5,690	6,800	855	659	415	188	315	598	6,800	774
9	1,820	4,100	4,360	9,100	855	971	315	331	246	3,850	3,720	774
10	1,420	5,690	6,800	8,230	855	928	280	315	928	2,380	2,740	720
11	1,160	4,360	9,400	5,690	828	659	471	188	828	1,680	2,040	720
12	1,370	3,220	7,360	4,360	788	544	396	188	720	1,680	1,680	720
13	1,620	2,740	5,150	3,600	720	490	315	415	1,560	1,680	2,140	708
14	8,520	2,140	5,690	3,350	622	443	301	443	928	1,420	2,140	720
15	5,960	1,920	5,150	9,700	576	576	260	396	659	1,190	1,920	734
16	4,620	1,620	4,100	8,520	544	471	234	356	855	4,100	1,700	814
17	3,600	1,370	3,600	5,960	512	443	234	280	3,850	3,720	1,480	1,190
18	2,740	1,300	3,100	4,360	380	396	188	217	2,620	18,200	1,480	1,820
19	2,140	1,160	2,980	3,480	471	396	164	188	1,520	10,300	3,600	1,720
20	1,720	1,680	6,240	4,880	471	315	150	140	1,030	5,150	3,850	1,520
21	1,920	1,720	6,800	5,690	396	356	140	140	788	2,860	2,620	1,310
22	3,100	1,420	4,880	5,420	396	356	140	120	622	1,920	2,140	1,300
23	8,520	1,240	3,720	4,360	443	490	140	101	576	2,380	1,620	5,420
24	5,960	1,130	3,220	3,850	490	396	150	109	490	3,100	1,500	4,620
25	3,980	1,240	2,620	3,220	396	315	140	109	443	2,140	1,520	5,690
26	3,220	1,330	2,140	2,860	331	315	109	109	331	1,720	1,680	4,880
27	3,850	1,520	2,740	2,380	356	356	101	132	280	1,420	1,520	5,690
28	5,690	1,720	5,150	2,040	315	443	101	101	315	1,190	1,480	6,800
29	6,800	.....	4,100	1,720	512	396	120	120	315	971	1,440	4,620
30	35,100	.....	3,850	1,720	855	315	120	132	380	828	1,520	3,480
31	19,300	.....	4,100	.....	1,000	.....	101	217	.....	720	.....	3,720

Monthly discharge of Greenbrier River at Alderson, W. Va., for 1911.

[Drainage area, 1,340 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	35,100	1,160	7,040	5.25	6.05	A.
February	9,100	1,130	2,910	2.17	2.26	A.
March	9,400	1,240	4,380	3.27	3.77	A.
April	17,800	1,720	5,780	4.31	4.81	A.
May	1,720	315	747	.557	.64	A.
June	971	315	522	.390	.44	A.
July	471	101	231	.172	.20	B.
August	443	86	196	.146	.17	B.
September	3,850	246	975	.728	.81	A.
October	18,200	315	2,600	1.94	2.24	A.
November	10,300	415	2,200	1.64	1.83	A.
December	6,800	708	2,200	1.64	1.89	A.
The year	35,100	86	2,480	1.85	25.11	

GAULEY RIVER AT ALLINGDALE, W. VA.

Location.—At Baltimore & Ohio Railroad bridge, one-fourth mile south of depot at Allingdale, W. Va., and immediately below the mouth of Rock Creek.

Records available.—July 3, 1908, to December 31, 1911.

Drainage area.—248 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged since established.

Channel.—Rough and irregular, but probably permanent.

Discharge measurements.—Made from upstream side of bridge or from wooden bridge near depot. The bottom of the stream is rough and irregular, but with extreme care accurate measurements can be made. The measuring section at the railroad bridge is a poor one, and measurements are made at the wooden bridge near the railroad depot whenever possible.

Point of zero flow.—Levels taken August 15, 1910, indicate that there would be no flow past the gage if the river stage were to fall to 3.33 feet $\pm$0.2 foot.

Winter flow.—Ice may affect the relation of gage height to discharge for short periods during December, January, and February.

Accuracy.—Gage-height record considered only fair. Sufficient data have not been obtained to permit estimates of discharge to be made.

Discharge measurements of Gauley River at Allingdale, W. Va., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Oct. 24	Bailey & Perwien	5.82	599
24	....do	5.80	[a] 586
27	....do	5.40	380

[a] Measurement made at wooden bridge above regular section.

Daily gage height, in feet, of Gauley River at Allingdale, W. Va., for 1911.

[J. L. Cogar, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.43	7.64	5.71	5.78	5.93	4.63	5.41	4.05	5.28	4.39	5.02	5.65
2	9.34	7.45	5.63	5.84	6.23	4.65	5.04	4.05	5.18	4.44	4.98	5.54
3	9.61	7.00	5.43	5.88	5.98	4.63	4.61	4.07	4.28	4.51	4.92	5.45
4	8.13	6.85	5.51	6.75	5.93	4.61	4.53	4.06	4.26	5.13	4.90	5.46
5	6.93	6.23	5.57	6.90	5.74	4.60	4.52	4.03	4.26	5.08	4.85	5.50
6	6.61	6.08	6.38	8.40	5.68	4.60	4.50	4.03	4.23	5.03	4.90	5.52
7	6.28	5.99	8.01	7.13	5.44	4.58	6.33	4.07	4.21	5.58	7.69	5.49
8	6.18	5.93	6.98	6.73	5.25	4.51	5.98	5.13	4.24	9.18	6.60	5.46
9	5.75	6.13	6.59	6.33	5.12	4.45	5.28	4.83	6.55	8.43	6.35	5.38
10	5.48	5.95	6.44	6.01	5.11	4.40	5.13	4.51	5.33	8.05	6.21	5.35
11	5.53	5.83	6.72	5.93	5.08	4.38	5.41	4.43	5.13	7.83	5.94	5.34
12	5.59	5.75	6.75	5.90	5.03	4.93	5.43	4.34	5.11	7.33	5.53	5.34
13	10.58	5.70	6.83	6.23	5.02	5.11	5.28	4.28	5.13	6.45	5.51	5.35
14	9.38	5.63	6.98	6.84	4.93	5.12	4.88	4.24	5.17	6.28	5.43	5.30
15	9.05	5.53	6.65	7.73	4.85	5.55	4.73	4.21	5.18	6.83	5.33	5.32
16	8.40	5.45	6.23	6.24	4.48	4.58	4.63	4.45	7.65	6.68	5.41	5.40
17	7.18	5.23	6.15	5.28	4.35	4.53	4.53	4.48	6.78	7.28	5.50	6.10
18	6.53	5.18	6.08	5.24	4.28	4.59	4.44	4.43	6.28	9.18	5.82	6.04
19	6.13	5.29	6.59	6.05	4.28	4.63	4.43	4.34	6.18	7.58	6.79	6.00
20	5.90	5.53	8.32	6.93	4.30	4.59	4.43	4.18	5.53	7.08	6.32	5.90
21	5.83	5.42	7.39	7.13	4.43	4.47	4.41	4.18	5.23	6.13	5.89	5.91
22	7.48	5.39	6.33	6.93	4.53	4.40	4.43	4.16	5.08	6.08	5.81	6.02
23	7.18	5.42	6.38	6.89	4.58	4.38	4.43	4.14	5.04	6.04	5.65	6.01
24	6.43	5.63	6.33	6.88	4.58	4.35	4.42	4.13	5.01	5.93	5.58	6.12
25	6.25	5.53	6.25	6.35	4.56	4.48	4.40	4.11	4.28	5.81	5.53	6.45
26	6.68	5.52	6.13	6.18	4.54	5.08	4.35	4.09	4.24	5.82	5.56	6.55
27	7.62	5.51	5.98	5.98	4.53	5.28	4.33	4.07	4.23	5.80	5.79	6.80
28	8.23	5.73	5.92	5.62	4.53	5.53	4.31	4.07	4.22	5.31	5.71	6.69
29	9.18	.....	5.92	5.59	4.50	5.41	4.30	4.13	4.28	5.19	5.70	6.63
30	16.08	.....	5.94	5.73	4.48	5.28	4.18	5.23	4.34	5.15	5.68	5.95
31	8.44	.....	6.05	.....	4.47	.....	4.08	6.08	.....	5.09	.....	6.30

NOTE.—Observer made no report concerning ice. Relation of gage height to discharge probably not affected by ice during 1911.

GAULEY RIVER NEAR SUMMERSVILLE, W. VA.

Location.—At highway bridge known at Brock's Bridge, 2½ miles southeast of Summersville, W. Va., and one-eighth mile below mouth of Muddlety Creek.

Records available.—July 6, 1908, to December 31, 1911.

Drainage area.—686 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged since established.

Channel.—Permanent.

Discharge measurements.—Made from downstream side of bridge.

Winter flow.—Relation of gage height to discharge may be affected by ice for a week or two at a time during December, January, and February.

Accuracy.—Gage-height records are considered reliable. Sufficient data have not been obtained to permit estimates of discharge to be made.

The following discharge measurement was made by C. T. Bailey:

July 28, 1911: Gage height, 4.10 feet; discharge, 114 second-feet.

Daily gage height, in feet, of Gauley River near Summersville, W. Va., for 1911.

[J. W. Dermody, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	9.60	9.30	6.10	6.95	5.70	5.40	4.15	3.65	5.75	5.15	4.95	6.95
2	13.00	9.30	5.45	6.75	6.10	5.10	3.70	3.65	5.25	6.6	4.9	6.5
3	13.50	8.60	5.30	6.90	5.75	4.55	4.00	3.65	4.55	8.9	4.85	5.95
4	10.50	8.15	5.75	8.95	5.85	4.15	4.30	3.30	3.90	7.1	4.65	5.85
5	8.90	7.45	5.15	10.85	5.50	4.10	4.05	3.50	4.65	6.5	4.4	5.5
6	7.35	7.15	8.65	10.05	5.50	5.25	3.50	3.90	5.00	6.15	5.1	5.3
7	7.10	6.60	10.40	8.70	4.85	4.95	3.90	4.10	5.00	5.45	9.95	5.3
8	6.70	6.20	9.35	8.45	4.75	4.65	5.30	4.65	4.30	9.8	8.35	5.1
9	6.15	7.10	8.05	9.60	4.80	4.35	5.15	4.45	4.90	8.1	7.55	5.45
10	5.65	6.85	8.20	9.20	4.70	4.10	3.90	4.10	5.80	7.2	6.9	5.35
11	5.85	6.72	8.30	8.10	4.80	3.55	4.10	3.75	5.75	7.65	6.4	5.3
12	5.75	6.48	7.75	7.35	4.75	4.25	5.05	3.90	7.15	8.0	5.9	5.75
13	12.60	6.20	8.40	7.35	4.55	5.35	5.05	3.60	6.15	7.55	7.1	5.6
14	12.10	6.00	8.50	7.30	4.75	4.95	4.55	3.35	5.95	6.8	7.05	5.55
15	11.20	5.85	8.00	10.10	4.65	4.40	4.40	3.95	5.30	7.1	6.75	5.15
16	10.70	5.30	7.20	8.85	4.60	4.55	3.90	3.70	9.65	9.3	6.45	6.15
17	9.10	5.05	7.05	7.50	4.40	3.80	3.90	4.60	7.70	8.15	6.1	6.8
18	7.75	4.95	7.05	7.25	4.30	3.95	3.85	4.15	6.70	13.0	6.7	6.95
19	7.20	5.35	6.90	6.70	4.35	4.80	3.95	3.80	6.05	9.85	8.45	6.5
20	6.75	5.75	10.00	8.80	4.25	4.90	3.65	3.70	5.65	8.85	7.15	6.25
21	6.70	5.70	8.80	9.35	4.10	4.30	3.35	4.05	5.35	7.55	7.0	5.95
22	9.80	5.12	8.00	9.00	3.75	4.35	4.15	3.75	5.30	6.6	6.45	5.75
23	9.20	5.50	8.10	9.25	4.15	4.05	3.45	3.75	5.40	7.2	6.05	7.15
24	7.95	5.35	7.60	8.75	4.45	4.15	3.65	3.55	4.95	6.8	5.8	8.0
25	7.25	5.50	7.25	7.90	4.80	3.25	3.95	3.25	4.75	6.3	6.1	7.65
26	7.90	5.15	6.80	7.40	4.35	4.20	4.05	3.55	4.60	6.05	6.65	7.3
27	10.85	7.30	7.20	7.00	4.35	4.55	4.10	4.05	4.65	5.8	6.35	7.75
28	10.20	5.70	7.20	6.40	4.10	5.55	3.50	4.20	4.50	5.6	6.6	7.55
29	9.45	.....	6.40	6.45	4.05	5.45	3.60	4.05	4.75	5.5	7.25	7.35
30	16.65	.....	7.00	6.05	3.90	4.90	4.20	4.00	5.15	5.3	7.3	7.15
31	10.85	.....	6.90	.....	4.35	.....	3.70	5.05	.....	5.3	.....	7.55

NOTE.—Observer made no report concerning ice. Relation of gage height to discharge probably not affected by ice during 1911.

GAULEY RIVER NEAR BELVA, W. VA.

Location.—Three-fourths mile below Chesapeake & Ohio Railway bridge at Belva, W. Va., one-fourth mile below the mouth of Twentymile Creek, and about 5½ miles above mouth of river at Gauley Bridge.

Records available.—August 25, 1908, to December 31, 1911.

Drainage area.—1,420 square miles.

Gage.—Vertical staff gage fastened to tree on right bank; datum unchanged since established.

Channel.—Coarse gravel; practically permanent.

Discharge measurements.—Made from a boat 1,000 feet above gage or by wading.

Floods.—No records of floods previous to installation of gage are available. Maximum gage height since installation of gage was approximately 19 feet January 30, 1911.

Winter flow.—Relation of gage height to discharge may be affected by ice at intervals during December, January, and February.

Accuracy.—Records of gage height are accurate and reliable. Sufficient data have not been obtained to permit estimates of discharge to be made.

Discharge measurements of Gauley River near Belva, W. Va., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 15	Bailey and Perwien	4.37	2,830
16	.....do.....	6.50	6,730

Daily gage height, in feet, of Gauley River near Belva, W. Va., for 1911.

[C. L. Davis, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.25	8.25	3.80	4.92	3.80	2.10	2.34	1.48	2.66	2.45	2.65	4.30
2	9.95	7.78	3.68	4.78	3.70	2.92	2.12	1.38	2.92	2.68	2.55	3.98
3	10.95	6.78	3.58	4.78	3.70	2.68	1.96	1.31	2.52	5.42	2.49	3.75
4	9.10	6.02	3.35	6.62	3.60	2.38	1.88	1.22	2.25	4.58	2.36	3.55
5	7.10	5.45	3.35	8.95	3.45	2.25	2.10	1.18	2.62	3.89	2.31	3.22
6	5.72	4.95	6.10	9.30	3.20	2.42	2.00	1.09	2.42	3.42	2.84	3.00
7	5.01	4.62	10.00	7.41	3.12	2.58	1.90	1.04	2.42	3.12	6.18	3.02
8	4.48	4.35	8.42	6.35	3.02	2.40	1.92	1.12	2.32	4.88	6.20	3.00
9	4.12	4.60	6.70	7.08	2 98	2.24	2.88	1.76	2.20	4.30	5.12	2.95
10	3.75	5.22	6.05	7.05	2.92	2.08	2.41	2.05	3.30	3.30	4.45	2.92
11	3.55	4.96	6.00	6.22	2.86	1.98	2.30	1.98	3.12	4.42	3.95	3.01
12	3.65	4.61	5.70	5.51	2.82	1.88	2.60	1.75	3.58	5.00	3.65	3.05
13	7.28	4.36	5.39	5.08	2.72	1.88	2.70	1.65	3.38	4.68	4.08	3.10
14	9.68	4.05	5.95	4.92	2.58	2.70	2.58	1.58	3.08	4.15	4.45	3.10
15	7.76	3.72	5.82	7.00	2.49	2.50	2.28	1.50	2.82	4.20	4.22	3.05
16	8.65	3.58	5.08	6.55	2.42	2.34	2.08	1.52	4.60	6.39	4.00	3.30
17	6.95	3.38	4.62	5.82	2.35	2.20	1.95	1.68	4.80	5.28	3.70	4.08
18	5.80	3.28	4.00	5.38	2.34	2.20	1.82	1.85	4.09	9.55	3.85	4.38
19	5.00	3.33	4.31	4.68	2.30	2.18	1.72	1.92	3.34	7.88	5.38	4.02
20	4.56	3.90	6.30	5.42	2.24	2.34	1.70	1.78	3.04	6.05	5.18	3.75
21	4.50	4.34	5.85	6.85	2.19	2.40	1.70	1.65	2.90	5.00	4.61	3.55
22	7.32	4.10	5.75	6.72	2.14	2.28	1.70	1.56	3.12	4.25	4.14	3.50
23	7.28	3.90	5.50	7.28	2.09	2.12	1.62	1.45	3.08	4.02	3.78	3.92
24	6.12	3.72	5.15	6.58	2.02	2.00	1.68	1.34	2.88	4.30	3.65	5.42
25	5.42	3.52	4.62	5.72	2.15	1.88	1.68	1.28	2.62	3.88	4.05	5.35
26	5.38	3.50	4.35	5.15	2.25	2.04	1.65	1.18	2.40	3.56	4.25	5.25
27	8.48	3.50	4.25	4.66	2.12	2.25	1.78	1.14	2.28	3.35	4.15	5.75
28	7.72	3.58	4.72	4.24	2.02	2.30	1.80	1.11	2.19	3.17	4.18	6.35
29	7.80	.....	4.42	4.00	1.99	2.65	1.72	1.08	2.25	2.96	4.54	5.72
30	16.00	.....	4.40	3.85	2.18	2.55	1.62	1.18	2.48	2.86	4.68	4.92
31	10.55	.....	4.88	.....	2.15	.....	1.54	1.58	.....	2.76	.....	4.70

NOTE.—Observer made no notes concerning ice. Relation of gage height to discharge probably not affected by ice during 1911.

CHERRY RIVER AT RICHWOOD, W. VA.

Location.—At the highway bridge at Richwood, W. Va., half a mile below junction of North and South Forks.

Records available.—July 3, 1908, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Standard chain gage attached to bridge; datum unchanged since established.

Channel.—Coarse gravel; practically permanent, but at different times stones and bowlders have been taken from the river bed in the vicinity of the point of control and the relation of gage height to discharge has thereby been affected. The first stones were removed during August, 1909; additional stones were removed during May, June, July, and August, 1911.

Discharge measurements.—Made from downstream side of bridge.

Point of zero flow.—A determination by leveling August 16, 1910, indicates that there would be no flow past the gage if the river stage were to fall to 1.3 feet±0.2 foot.

Winter flow.—The relation of gage height to discharge is at times affected by ice during December, January, and February.

Accuracy.—See discussion under "Channel." Sufficient data have not been obtained to permit estimates of discharge to be made.

The following discharge measurement was made by Bailey and Perwien:

October 25, 1911: Gage height, 2.74 feet; discharge, 205 second-feet.

Daily gage height, in feet, of Cherry River at Richwood, W. Va., for 1911.

[Floyd Artrip, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.85	3.70	2.60	2.73	2.65	3.15	2.22	2.00	2.47	2.35	2.35	2.80
2	5.15	3.60	2.60	2.72	2.65	2.62	2.15	1.93	2.23	3.58	2.30	2.72
3	4.95	3.30	2.55	3.20	2.60	2.42	2.45	1.87	2.15	3.43	2.28	2.62
4	4.02	3.18	2.60	3.78	2.52	2.30	2.15	1.85	2.20	3.08	2.25	2.52
5	3.45	3.02	2.50	4.93	2.45	2.90	2.10	2.15	2.60	2.85	2.25	2.45
6	3.25	2.88	4.00	3.95	2.40	2.75	2.20	2.30	2.50	2.67	2.95	2.45
7	3.00	2.80	3.75	3.50	2.40	2.58	2.42	2.07	2.40	2.95	3.42	2.42
8	2.90	2.85	3.32	3.40	2.40	2.50	2.52	2.37	2.25	3.37	3.00	2.42
9	2.80	3.00	3.10	3.62	2.40	2.33	2.23	2.13	3.80	3.05	2.82	2.42
10	2.75	2.95	3.12	3.27	2.33	2.25	2.15	2.08	2.92	2.85	2.72	2.50
11	2.70	2.88	3.30	3.10	2.27	2.28	2.45	2.00	2.83	3.17	2.62	2.52
12	3.65	2.80	3.20	3.12	2.30	2.70	2.38	1.95	2.80	3.25	2.70	2.60
13	5.88	2.72	3.40	3.32	2.28	2.55	2.23	2.03	2.67	3.05	2.98	2.52
14	4.55	2.65	3.30	3.60	2.25	2.43	2.13	2.05	2.60	2.90	2.80	2.50
15	4.90	2.62	3.12	3.85	2.20	2.37	2.05	2.10	3.15	3.70	2.78	2.52
16	4.20	2.58	3.00	3.30	2.17	2.35	2.08	2.70	3.75	3.47	2.70	2.82
17	3.50	2.50	2.90	3.15	2.20	2.30	2.18	2.25	3.13	3.55	2.60	2.90
18	3.25	2.55	2.85	3.00	2.20	2.40	2.17	2.10	2.80	4.75	3.18	2.78
19	3.05	2.70	3.12	2.95	2.20	2.40	2.07	2.03	2.70	3.72	3.15	2.65
20	2.90	2.62	3.65	3.65	2.15	2.40	2.00	2.00	2.65	3.30	2.95	2.60
21	3.05	2.50	3.25	3.47	2.10	2.30	2.02	2.00	2.53	2.97	2.88	2.60
22	3.62	2.60	3.10	3.50	2.10	2.22	2.10	1.93	2.57	2.92	2.75	2.62
23	3.42	2.60	3.25	3.52	2.10	2.20	2.05	1.90	2.40	3.00	2.62	3.30
24	3.20	2.50	2.98	3.25	2.85	2.17	2.10	1.85	2.25	2.88	2.70	3.10
25	3.02	2.50	2.88	3.17	2.40	2.27	2.30	1.90	2.28	2.67	2.78	3.10
26	3.50	2.50	2.75	3.00	2.27	2.30	2.20	2.00	2.23	2.62	2.65	3.10
27	3.70	2.65	3.23	2.92	2.28	2.40	2.10	1.93	2.17	2.52	2.62	3.50
28	3.85	2.75	2.98	2.82	2.20	2.62	2.03	1.87	2.57	2.48	2.72	3.28
29	3.98	.....	2.90	2.80	2.18	2.33	2.00	2.07	2.58	2.45	3.05	3.05
30	5.95	.....	3.00	2.67	2.17	2.23	1.95	2.25	2.48	2.40	2.88	2.90
31	3.85	.....	2.83	.....	2.70	.....	2.00	2.65	.....	2.38	.....	3.35

NOTE.—Feb. 22 observer reported "Ice in shoals." Relation of gage height to discharge probably not materially affected by ice during 1911.

MEADOW RIVER NEAR RUSSELLVILLE, W. VA.

Location.—At Bays Ferry, 3 miles below Russellville, W. Va., one-fourth mile below mouth of Youngs Creek.

Records available.—July 17, 1908, to December 31, 1911.

Drainage area.—297 square miles.

Gage.—Standard chain gage attached to trees on left bank just above the ferry, datum unchanged since established.

Channel.—Permanent.

Discharge measurements.—Made from a boat or by wading.

Winter flow.—Relation of gage height to discharge is at times affected by ice gorges.

Accuracy.—Gage-height records are considered very reliable. In the fall backwater is sometimes caused at the gage by leaves lodging at the riffle below. Sufficient data have not been collected to permit estimates of discharge to be made.

The following discharge measurement was made by C. T. Bailey by wading at section above regular measuring section:

July 29, 1911: Gage height, 3.03 feet; discharge, 15.2 second-feet.

Daily gage height, in feet, of Meadow River near Russellville, W. Va., for 1911.

[J. R. Bays, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	8.44	9.19	4.96	5.85	5.07	4.41	3.32	2.90	3.76	3.17	3.98	5.34
2	10.09	8.57	4.98	5.76	5.20	4.53	3.20	2.87	4.04	3.32	3.89	5.16
3	11.04	7.62	4.84	6.26	5.42	4.10	3.13	2.84	3.72	3.76	3.81	4.96
4	9.74	6.93	4.79	8.34	5.35	3.84	3.22	2.80	3.46	4.28	3.74	4.73
5	7.97	6.51	4.67	9.98	5.18	3.76	3.58	2.75	3.26	4.22	3.69	4.80
6	6.84	6.02	8.19	9.52	4.96	3.72	3.42	2.72	3.22	4.11	3.94	4.60
7	6.14	5.74	9.24	8.43	4.80	3.89	3.98	2.95	3.20	3.94	7.33	4.42
8	5.78	5.58	8.59	7.64	4.68	3.66	3.72	3.44	3.16	4.33	7.02	4.30
9	5.30	6.50	7.31	8.00	4.60	3.52	3.58	3.42	3.03	4.43	6.36	4.34
10	5.80	6.90	7.28	7.88	4.52	3.40	3.37	3.19	2.98	4.32	5.86	4.30
11	5.04	6.69	7.70	7.26	4.44	3.37	3.38	3.25	3.03	4.60	5.38	4.32
12	4.91	6.32	7.30	6.65	4.31	3.36	4.10	3.26	3.28	5.10	4.98	4.38
13	5.80	5.90	6.80	6.51	4.23	3.64	3.98	3.14	3.36	4.78	5.18	4.40
14	7.22	5.53	6.34	6.42	4.13	3.98	3.69	3.01	3.34	4.55	5.29	4.40
15	7.18	5.26	6.02	7.52	4.05	3.83	3.45	2.94	3.32	5.15	5.28	4.36
16	7.53	4.95	5.78	7.72	3.99	3.67	3.26	2.94	3.41	5.40	5.16	4.49
17	6.94	4.76	5.52	7.15	3.94	3.56	3.20	2.90	3.95	5.12	4.93	4.68
18	6.22	4.70	5.42	6.49	3.92	3.56	3.18	2.90	3.78	9.00	5.62	5.04
19	5.77	4.82	5.36	5.98	3.88	3.58	3.10	3.01	3.56	7.72	6.30	5.02
20	5.48	5.38	7.22	6.93	3.81	3.72	3.06	3.00	3.41	6.58	5.88	4.94
21	5.60	5.58	7.08	7.46	3.75	3.66	3.03	2.98	3.32	5.88	5.52	4.78
22	7.24	5.54	6.52	7.40	3.67	3.58	3.11	2.91	3.84	5.24	5.24	4.74
23	7.17	5.28	6.16	7.63	3.62	3.44	3.08	2.85	3.88	5.14	4.99	5.24
24	6.81	5.73	5.70	6.98	3.57	3.34	3.12	2.82	3.82	5.24	5.01	6.30
25	6.35	5.10	5.35	6.40	3.58	3.28	3.14	2.78	3.63	4.96	5.42	6.39
26	6.22	5.03	5.18	5.92	3.68	3.24	3.10	2.76	3.48	4.71	5.42	6.57
27	7.06	5.00	5.40	5.54	3.62	3.54	3.04	2.74	3.31	4.52	5.35	7.28
28	7.18	4.96	5.84	5.28	3.56	3.55	3.03	2.72	3.28	4.37	5.41	7.30
29	8.06	.....	5.76	5.12	4.52	3.44	3.02	2.90	3.24	4.24	5.68	6.72
30	13.02	.....	5.84	5.04	4.28	3.40	3.00	3.00	3.19	4.14	5.55	6.20
31	11.06	.....	5.94	.....	3.88	.....	2.94	3.12	.....	4.03	.....	6.11

NOTE.—Observer reported ice as follows: Jan. 10 and Feb. 22, ice gorged; Feb. 24 and Dec. 5, backwater from ice.

ELK RIVER AT WEBSTER SPRINGS, W. VA.

Location.—At suspension bridge on the grounds of the Webster Springs Hotel at Webster Springs, W. Va., one-fourth mile above the mouth of Back Fork Creek.

Records available.—July 1, 1908, to December 31, 1911.

Drainage area.—168 square miles.

Gage.—Vertical staff attached to right abutment of bridge; datum unchanged since established.

Channel.—Coarse gravel; practically permanent.

Discharge measurements.—Made from upstream side of bridge or by wading.

Point of zero flow.—Levels taken August 13, 1910, indicate that there would be no flow past the gage at a stage of 0.95 foot ±0.2 foot.

Winter flow.—Relation of gage height to discharge is sometimes affected by ice.

Accuracy.—Gage-height records are considered reliable. Sufficient data have not been obtained to permit estimates of discharge to be made.

The following discharge measurement was made by Bailey and Perwien:

October 26, 1911: Gage height, 2.62 feet; discharge, 218 second-feet.

Daily gage height, in feet, of Elk River at Webster Springs, W. Va., for 1911.

[Cherry Woodzell, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.10	4.00	3.00	2.92	2.60	2.04	2.06	1.57	2.65	2.60	2.30	2.98
2	5.20	3.89	2.92	2.87	2.72	1.97	1.98	1.61	2.35	3.10	2.22	2.85
3	5.20	3.55	2.78	3.05	2.62	1.86	1.92	1.59	2.10	3.50	2.16	2.72
4	4.40	3.45	2.70	3.75	2.58	1.78	1.91	1.54	1.92	3.18	2.14	2.68
5	3.75	3.20	2.65	5.15	2.50	1.95	1.88	1.50	1.82	3.30	2.11	2.58
6	3.32	3.02	4.05	4.30	2.46	2.08	1.82	1.50	1.79	2.90	2.45	2.54
7	3.05	2.92	4.25	3.90	2.42	2.06	1.88	1.80	1.76	3.60	4.25	2.50
8	2.88	2.88	3.75	3.60	2.36	2.08	1.84	1.76	1.74	4.55	3.62	2.44
9	2.80	2.78	3.38	4.25	2.30	2.02	1.90	2.10	1.71	3.68	3.15	2.50
10	2.65	2.65	3.70	3.72	2.30	1.92	1.82	1.90	2.45	3.25	2.95	2.56
11	2.50	2.99	3.80	3.35	2.27	1.82	1.80	1.72	2.75	3.35	2.75	2.60
12	3.05	2.92	3.45	3.15	2.22	2.32	1.82	1.62	3.05	3.45	2.75	2.60
13	5.80	2.82	3.90	2.98	2.16	2.70	1.86	1.52	2.95	3.15	3.00	2.60
14	4.75	2.68	3.85	3.35	2.11	2.40	1.81	1.50	2.35	3.00	3.00	2.60
15	4.90	2.58	3.65	4.20	2.06	2.25	1.72	1.50	2.20	4.00	2.92	2.60
16	4.60	2.54	3.48	3.70	2.01	2.08	1.62	1.50	3.40	3.80	2.80	2.85
17	3.35	2.50	3.25	3.35	2.00	1.99	1.60	1.50	3.30	3.50	2.80	3.15
18	3.40	2.48	3.12	3.15	2.00	2.12	1.58	1.50	2.95	5.40	2.95	3.00
19	3.08	2.52	3.35	3.00	1.99	2.70	1.58	1.50	2.58	4.18	3.62	2.96
20	2.90	2.58	4.28	4.45	2.00	2.60	1.56	1.48	2.42	3.52	3.25	2.88
21	3.00	2.52	3.72	3.90	1.96	2.35	1.52	1.42	2.25	3.15	2.98	2.82
22	4.05	2.49	3.42	3.70	1.91	2.15	1.65	1.40	2.50	2.92	2.85	2.72
23	3.72	2.45	3.80	3.75	1.90	2.02	1.70	1.38	2.45	2.95	2.72	3.50
24	3.38	2.48	3.45	3.50	1.89	2.22	1.72	1.36	2.25	2.85	2.78	3.48
25	3.15	2.50	3.20	3.35	1.88	2.30	1.69	1.31	2.22	2.78	3.00	3.38
26	4.65	2.58	2.98	3.22	1.84	2.21	1.65	1.38	2.28	2.68	3.00	3.40
27	4.60	2.88	3.48	3.05	1.79	2.28	1.61	1.75	2.18	2.56	3.00	3.85
28	4.85	3.10	3.20	2.95	1.74	2.58	1.54	1.80	2.15	2.51	3.00	3 65
29	4.50	.....	3.00	2.82	1.71	2.38	1.50	1.78	2.75	2.46	3.10	3.25
30	7.40	.....	3.08	2.68	1.70	2.22	1.50	2.48	2.92	2.38	3.08	3.11
31	4.40	.....	3.02	.....	1.70	.....	1.50	2.80	.....	2.30	.....	3.10

NOTE.—Relation of gage height to discharge probably not affected by ice during 1911.

ELK RIVER AT GASSAWAY, W. VA.

Location.—At the Coal & Coke Railroad bridge in the northeastern part of Gassaway, W. Va., immediately below the mouth of Little Otter Creek.

Records available.—July 1, 1908, to December 31, 1911.

Drainage area.—578 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged since established.

Channel.—Coarse gravel; point of control is probably permanent.

Discharge measurements.—Made from upstream side of bridge or by wading.

Point of zero flow.—A determination by leveling August 12, 1910, indicates that there would be no flow past the gage if the stage were to fall to 0.5 foot, ±0.2 foot.

Winter flow.—Ice may affect the relation of gage height to discharge for short periods.

Accuracy.—Gage-height record not considered better than "good." Sufficient data have not been obtained to permit estimates of discharge to be made.

The following discharge measurement was made by C. T. Bailey:

October 6, 1911: Gage height, 3.42 feet; discharge, 888 second-feet.

Daily gage height, in feet, of Elk River at Gassaway, W. Va., for 1911.

[H. A. Hays, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.46	8.98	4.36	4.26	3.22	1.58	2.07	1.31	3.15	4.07	2.20	3.94
2	9.51	6.94	3.91	4.02	3.26	1.61	1.91	1.27	2.68	4.98	2.17	3.82
3	9.64	6.10	3.57	3.95	3.17	1.72	1.81	1.25	2.45	7.16	2.12	3.76
4	7.56	5.34	3.26	4.59	3.02	1.70	1.85	1.23	1.92	5.16	2.48	3.44
5	5.15	4.90	3.12	8.75	2.90	1.67	1.90	1.25	1.83	4.11	2.30	2.86
6	4.96	4.27	3.93	8.73	2.82	1.71	1.71	1.33	1.78	3.43	3.41	2.63
7	4.08	4.08	7.91	7.23	2.68	1.90	1.67	1.25	1.72	3.62	7.84	2.54
8	3.76	3.85	9.03	6.27	2.62	2.04	1.65	1.34	1.66	11.82	6.19	2.43
9	3.31	3.96	6.46	6.53	2.52	2.16	1.75	1.44	1.66	6.84	4.87	2.39
10	3.08	3.87	5.87	7.53	2.47	2.11	1.73	1.28	1.72	5.65	3.98	2.32
11	2.66	3.81	5.75	6.00	2.39	2.05	1.73	1.24	3.68	5.08	3.46	2.38
12	2.68	3.70	5.35	5.00	2.34	1.94	2.07	1.24	5.13	6.31	3.38	2.47
13	6.65	3.57	5.05	4.18	2.28	2.12	1.89	1.29	3.42	5.09	3.83	2.44
14	12.16	3.51	5.87	4.06	2.20	2.63	1.73	1.28	3.33	4.32	4.44	2.53
15	10.03	3.46	5.57	5.47	2.07	2.31	1.60	1.33	2.92	7.48	4.15	2.91
16	8.28	3.42	5.17	5.37	2.04	2.06	1.59	1.26	3.80	7.37	3.76	3.08
17	7.08	3.41	4.54	5.11	2.02	1.96	1.55	1.22	6.74	6.02	3.47	3.02
18	5.35	3.37	4.29	4.42	2.00	2.19	1.44	1.24	4.78	11.38	3.70	2.85
19	4.31	3.44	4.97	4.10	1.97	2.27	1.35	1.23	3.02	8.40	5.12	2.62
20	3.90	3.61	5.85	4.84	1.92	2.85	1.30	1.21	2.80	5.86	5.01	2.50
21	3.82	3.67	6.37	7.30	1.90	2.63	1.35	1.16	2.59	4.82	4.36	2.60
22	8.78	3.60	5.42	6.60	1.90	2.27	1.33	1.08	2.86	4.24	3.75	2.90
23	7.32	3.59	4.99	6.54	1.84	2.07	1.29	1.06	3.48	3.69	3.35	3.74
24	5.90	4.19	5.05	6.34	1.82	2.01	1.27	1.04	3.38	3.60	3.44	3.76
25	5.00	4.71	4.51	5.63	1.95	1.97	1.26	1.05	3.08	3.36	3.78	3.72
26	6.08	3.94	4.18	4.98	1.84	2.19	1.31	1.13	2.32	3.06	3.88	3.67
27	11.88	3.75	3.89	4.34	1.77	2.18	1.51	1.10	2.36	2.88	3.71	3.58
28	8.96	4.19	4.21	3.82	1.70	2.70	1.51	1.08	2.74	2.69	3.98	3.52
29	11.02	.....	3.68	3.55	1.64	2.17	1.52	1.20	3.07	2.57	4.46	3.48
30	26.22	.....	3.75	3.44	1.58	2.13	1.44	1.68	3.70	2.42	4.30	4.44
31	.....	.....	4.20	.....	1.56	.....	1.37	4.26	.....	2.29	.....	5.47

NOTE.—Relation of gage height to discharge probably not affected by ice during 1911.

ELK RIVER AT CLENDENNIN, W. VA.

Location.—At highway bridge in town of Clendennin, W. Va., immediately above mouth of Big Sandy Creek.

Records available.—June 27, 1908, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Standard chain gage attached to bridge; datum unchanged since established.

Channel.—Practically permanent; point of control is probably permanent.

Discharge measurements.—Made from downstream side of bridge or by wading.

Point of zero flow.—Levels taken August 11, 1910, indicate that there would be no flow past the gage if the stage were to fall to 1.0 foot±0.2 foot.

Winter flow.—Ice may affect the relation of gage height to discharge at times during the winter months.

Accuracy.—High water in Big Sandy Creek alone may produce backwater at the gage. This will not occur often, however, as the Big Sandy is a small stream. The gage reader has been instructed to note effect of backwater. Sufficient data have not been obtained to permit estimates of discharge to be made.

Discharge measurements of Elk River at Clendennin, W. Va., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Mar. 8	C. T. Bailey	11.98	11,200
Aug. 4	.....do	1.98	[a] 48.6

[a] Measurement made by wading.

Daily gage height, in feet, of Elk River at Clendennin, W. Va., for 1911.

[J. W. Riley, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.38	9.25	4.92	4.81	4.30	2.56	2.55	1.97	4.59	4.18	3.10	5.04
2	8.43	8.00	4.81	4.82	4.18	2.42	2.79	2.23	3.92	5.56	2.98	4.76
3	9.54	7.15	4.55	4.75	4.20	2.30	2.61	2.32	3.42	7.08	2.91	4.43
4	10.49	6.66	4.25	4.98	4.04	2.21	2.51	1.95	3.38	6.37	2.80	4.21
5	7.68	6.11	4.02	6.94	3.82	2.62	2.41	1.92	3.02	5.12	2.74	4.06
6	6.00	5.59	5.79	9.22	3.74	2.86	2.60	1.92	2.84	4.49	4.32	3.82
7	5.27	5.23	8.19	8.03	3.70	2.71	2.67	1.94	2.79	4.47	7.36	3.58
8	4.82	5.43	11.85	7.48	3.57	2.40	2.45	1.90	2.58	8.31	7.78	3.50
9	4.60	5.15	8.65	8.10	3.47	2.38	2.36	1.82	2.43	8.49	6.00	3.46
10	4.28	5.10	6.90	8.54	3.48	2.52	2.33	1.82	2.46	5.82	5.16	3.42
11	4.42	5.13	6.30	7.24	3.40	2.60	2.29	1.83	3.52	6.20	4.57	3.62
12	3.90	4.83	5.82	6.48	3.33	2.62	2.69	1.86	6.75	6.30	4.44	3.48
13	8.30	4.60	5.40	5.55	3.18	2.55	3.28	1.90	4.94	5.98	5.32	3.48
14	12.49	4.43	6.01	5.58	3.08	2.52	2.78	1.80	4.08	5.16	5.50	3.55
15	9.92	4.21	6.40	6.32	3.28	2.81	2.53	1.76	3.76	4.76	5.26	3.69
16	9.01	3.99	5.84	6.84	2.93	3.00	2.43	1.71	4.32	6.68	4.88	4.84
17	9.16	3.83	5.34	6.14	2.86	2.80	2.38	1.66	5.12	6.72	4.50	6.30
18	7.17	3.74	5.00	5.54	2.82	2.92	2.33	1.92	5.83	9.76	4.80	5.92
19	5.64	3.57	4.85	5.20	2.70	3.49	2.29	2.16	4.58	10.60	5.77	5.36
20	5.14	5.77	5.36	5.58	2.71	3.13	2.13	1.92	4.44	7.16	6.06	4.82
21	5.57	6.41	7.04	6.42	2.66	3.28	2.57	1.88	3.80	5.54	5.42	4.52
22	9.76	5.59	6.14	7.22	2.62	3.32	2.72	1.86	4.54	4.92	4.88	4.30
23	9.86	5.35	5.71	7.28	2.57	3.04	2.37	1.80	4.14	4.72	4.48	5.12
24	7.50	4.80	5.52	7.07	2.53	2.77	2.52	1.68	4.50	4.28	4.28	5.80
25	6.37	4.72	5.32	6.41	2.46	2.65	2.37	1.68	3.78	4.22	4.45	6.44
26	7.82	4.69	4.88	5.76	2.35	2.52	1.95	1.76	3.42	3.93	4.80	6.26
27	12.97	4.63	4.68	5.26	2.38	2.53	1.91	1.71	3.28	3.72	4.84	8.12
28	9.94	5.12	4.55	4.86	2.38	2.72	1.85	1.74	3.72	3.54	4.84	7.00
29	9.62	.....	4.58	4.52	2.36	2.69	1.83	1.72	3.83	3.38	4.65	6.12
30	21.62	.....	4.46	4.40	2.46	2.63	1.85	2.78	4.24	3.24	5.24	5.50
31	18.16	.....	4.62	.....	2.42	.....	1.81	3.48	.....	3.16	.....	5.82

NOTE.—Relation of gage height to discharge probably not affected by ice during 1911.

COAL RIVER AT BRUSHTON, W. VA.

Location.—At Chesapeake & Ohio Railway bridge at Brushton, W. Va., 500 feet above the mouth of Brush Creek.

Records available.—June 23, 1908, to December 31, 1911.

Drainage area.—379 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged since established.

Channel.—Practically permanent.

Discharge measurements.—Made from downstream side of bridge or by wading.

Winter flow.—The relation of gage height to discharge is little, if at all, affected by ice.

Accuracy.—Gage-height records are considered reliable. Sufficient data have not been obtained to permit estimates of discharge to be made.

Discharge measurements of Coal River at Brushton, W. Va., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Oct. 4	C. T. Bailey	2.75	468
4	.....do	2.54	356

Daily gage height, in feet, of Coal River at Brushton, W. Va., for 1911.

[G. W. Fitzpatrick, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.35	5.5	2.35	2.9	3.2	1.7	1.35	0.95	1.25	1.14	1.60	2.52
2	4.95	5.1	2.3	3.0	3.65	1.65	1.25	.95	1.1	1.79	1.54	2.40
3	5.5	4.15	2.25	3.8	3.65	1.5	1.15	.95	1.0	3.94	1.52	2.28
4	4.8	4.2	2.25	6.7	3.3	1.45	1.15	.95	1.0	2.66	1.52	2.23
5	3.55	4.1	2.2	8.1	3.0	1.5	1.15	.95	1.15	2.17	1.49	2.12
6	3.05	3.8	7.05	6.7	2.8	1.5	1.05	1.0	1.8	1.89	1.83	1.99
7	2.75	3.45	7.75	5.5	2.6	1.55	1.05	1.0	1.6	1.84	2.62	1.94
8	2.55	3.25	7.3	4.45	2.55	1.5	1.75	.9	1.4	2.38	2.95	1.90
9	2.35	3.15	5.25	5.55	2.45	1.45	1.8	.85	1.3	1.98	2.60	1.88
10	2.25	3.35	4.3	5.25	2.4	1.35	1.4	1.5	1.35	2.06	2.36	1.84
11	2.2	3.25	3.65	4.25	2.3	1.3	1.45	1.35	1.45	2.90	2.18	1.83
12	2.2	3.15	3.3	3.65	2.2	1.25	1.8	1.25	1.3	2.84	2.15	1.82
13	2.2	2.9	3.15	3.3	2.15	1.25	2.0	1.1	1.25	2.42	2.52	1.82
14	2.15	2.75	3.1	3.05	2.05	1.25	1.75	1.1	1.2	2.17	2.72	1.83
15	2.2	2.6	3.0	3.2	1.95	1.15	1.55	1.05	1.35	2.16	2.59	1.86
16	2.4	2.45	2.85	3.5	1.9	1.15	1.4	1.1	1.5	2.32	2.42	2.24
17	2.65	2.4	2.75	3.45	1.85	1.15	1.5	1.25	1.3	2.59	2.24	2.43
18	2.65	2.4	2.65	3.25	1.8	1.3	1.6	1.05	1.25	5.61	2.31	2.60
19	2.55	2.35	2.65	3.05	1.75	1.45	1.55	1.0	1.3	3.80	3.82	2.32
20	2.55	3.9	2.95	2.7	1.7	1.35	1.45	.9	1.4	2.88	2.69	2.23
21	3.25	4.7	3.35	3.5	1.65	1.3	1.35	1.0	1.4	2.45	2.76	2.24
22	6.0	3.9	3.25	3.95	1.65	1.25	1.25	1.0	1.75	2.22	2.52	2.24
23	5.0	3.45	3.1	4.55	1.6	1.15	1.25	.8	1.65	2.12	2.34	2.54
24	3.85	3.1	2.9	4.0	1.55	1.15	1.35	.8	1.55	2.10	2.42	2.99
25	3.35	2.9	2.75	3.6	1.45	1.15	1.3	.8	1.55	2.02	2.68	3.30
26	3.25	2.7	2.65	3.2	1.4	1.15	1.15	.9	1.4	1.94	2.85	3.40
27	3.7	2.6	2.65	3.0	1.35	1.2	1.05	.9	1.25	1.84	2.80	5.71
28	3.65	2.5	2.55	2.85	1.3	1.25	1.0	1.25	1.2	1.79	2.74	5.20
29	3.9	.....	2.6	2.65	1.25	1.45	.95	1.0	1.2	1.71	2.70	3.81
30	11.35	.....	2.6	2.7	1.25	1.5	.95	1.1	1.2	1.66	2.64	3.33
31	6.1	.....	2.7	.....	1.35	.....	.95	1.4	.....	1.61	.....	3.19

NOTE.—Observer made no report relative to ice. Relation of gage height to discharge probably not affected by ice during 1911.

COAL RIVER AT FUQUA, W. VA.

Location.—At W. C. Hoy's passenger ferry half a mile below Fuqua railroad station and 1 mile below the mouth of Fuqua Creek.

Records available.—October 12, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Staff gage in two sections on right bank.

Channel.—Firm sand.

Discharge measurements.—Made from boat 300 feet above gage or by wading.

Winter flow.—The relation of gage height to discharge may be affected by ice for short periods.

Accuracy.—Gage-height record is considered reliable. Sufficient data have not been obtained to permit estimates of discharge to be made.

The following discharge measurement was made by Bailey and Perwien:
October 13, 1911: Gage height, 2.85 feet; discharge, 700 second-feet.

Daily gage height, in feet, of Coal River at Fuqua, W. Va., for 1911.

[W. C. Hoy, observer.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1	.....	1.40	2.95	11	.....	2.34	1.80	21	2.95	3.48	2.69
2	.....	1.30	2.78	12	3.60	2.39	1.78	22	2.50	3.01	2.60
3	.....	1.30	2.62	13	2.85	2.80	1.78	23	2.25	2.70	3.48
4	.....	1.20	2.50	14	2.30	3.38	1.79	24	2.10	2.72	3.94
5	.....	1.20	2.32	15	2.10	3.18	1.95	25	1.95	3.50	4.38
6	.....	2.65	2.12	16	2.30	2.86	3.25	26	1.85	3.49	4.64
7	.....	3.50	2.02	17	3.88	2.53	3.67	27	1.70	3.52	7.72
8	.....	3.60	1.96	18	9.25	2.80	3.32	25	1.60	3.40	9.80
9	.....	3.08	1.89	19	6.10	5.32	3.04	29	1.55	3.30	6.15
10	.....	2.64	1.84	20	3.85	4.30	2.85	30	1.50	3.12	4.74
								31	1.40	.....	4.55

NOTE.—Relation of gage height to discharge probably not affected by ice during 1911.

COAL RIVER AT TORNADO, W. VA.

Location.—At highway bridge at Upper Falls railroad station, one-fourth mile above Tornado, W. Va., and 1 mile above mouth of Smith Creek.

Records available.—June 24, 1908, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Standard chain gage attached to bridge; datum unchanged since established.

Channel.—Practically permanent; strewn with large bowlders.

Discharge measurements.—Made from downstream side of bridge or by wading.

Point of zero flow.—Determined August 8, 1910, as approximately 1.2 feet. The control is a rough log dam and point of zero flow changes.

Winter flow.—The relation between gage height and discharge is affected by ice cover and gorges from one to two weeks at a time during December, January, and February.

Artificial control.—There is a low dam and water-power plant about 1,000 feet below the station.

Accuracy.—The low-water gage heights at this station are affected by the operation of the power plant below the station. Another gaging station has been established above the influence of this dam, by means of which the effect of the power plant upon the lower gage will be observed, after which this station will be discontinued and the upper station will be continued.

Discharge measurements of Coal River at Tornado, W. Va., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Mar. 9	C. T. Bailey	6.09	5,730
Oct. 3	.....do	4.46	3,010

Daily gage height, in feet, of Coal River at Tornado, W. Va., for 1911.

[G. C. Hoy, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.96	5.56	2.67	2.90	3.35	2.76	1.56	1.40	2.07	1.52	1.78	2.95
2	4.46	5.19	2.61	2.91	3.80	2.20	1.54	1.40	1.88	2.75	1.76	2.83
3	4.76	4.69	2.57	3.32	3.70	1.93	1.50	1.40	1.62	4.19	1.62	2.75
4	4.96	4.25	2.48	7.90	3.45	1.88	1.49	1.41	1.57	3.10	1.70	2.68
5	3.81	4.46	2.44	8.60	3.24	1.76	1.48	1.41	1.50	2.65	1.70	2.58
6	3.33	4.07	5.48	8.41	3.05	1.71	1.45	1.40	1.53	2.25	1.85	2.45
7	3.08	3.72	9.45	5.74	2.92	1.78	1.44	1.40	1.86	2.20	3.22	2.30
8	2.90	3.42	10.12	4.62	2.84	1.77	1.45	1.40	1.81	2.82	3.25	2.26
9	2.86	3.37	6.07	5.82	2.71	1.70	1.98	1.51	1.72	2.54	2.96	2.21
10	2.73	3.43	4.36	5.44	2.61	1.66	1.95	1.45	1.70	3.00	2.78	2.20
11	2.62	3.38	3.74	4.35	2.60	1.60	1.69	1.68	1.76	3.32	2.57	2.09
12	2.68	3.37	3.50	3.80	2.49	1.61	1.61	1.56	1.85	3.42	2.68	2.08
13	2.76	3.15	3.29	3.48	2.35	1.70	2.08	1.49	1.82	2.94	3.08	2.18
14	2.68	2.99	3.22	3.25	2.28	1.60	2.15	1.48	1.75	2.63	3.15	2.16
15	2.75	2.82	3.12	3.44	2.18	1.58	1.81	1.45	1.88	2.51	3.02	2.34
16	2.76	2.55	3.10	3.50	2.00	1.52	1.72	1.45	2.40	2.60	2.88	3.20
17	2.85	2.63	2.90	3.64	2.00	1.50	1.65	1.46	1.90	3.45	2.68	3.42
18	2.96	2.61	2.85	3.38	1.94	1.70	1.61	1.42	1.80	5.70	2.72	3.19
19	2.90	2.59	2.84	3.28	1.88	1.96	1.82	1.42	1.75	4.18	4.02	2.75
20	2.89	3.64	2.95	3.35	1.86	1.82	1.78	1.40	1.78	3.30	3.60	2.88
21	3.35	4.76	3.15	3.58	1.78	1.70	1.68	1.37	1.72	2.85	3.25	2.83
22	6.59	4.12	3.20	3.90	1.72	1.61	1.58	1.33	1.85	2.59	3.02	2.80
23	5.19	3.12	3.16	4.50	1.80	1.60	1.52	1.38	1.88	2.43	2.82	3.12
24	4.06	3.37	3.02	4.08	1.69	1.59	1.50	1.38	1.81	2.25	2.90	3.54
25	3.62	3.21	2.86	3.70	1.65	1.54	1.50	1.38	1.76	2.15	3.12	3.72
26	3.73	3.05	2.82	3.45	1.68	1.50	1.51	1.39	1.72	2.08	3.28	3.85
27	3.52	2.89	2.79	3.22	1.61	1.50	1.50	1.37	1.68	2.00	3.23	4.85
28	3.61	2.75	2.70	3.02	1.58	1.52	1.42	1.37	1.60	1.92	3.18	5.95
29	4.39	.....	2.70	2.94	1.53	1.55	1.40	2.25	1.56	1.87	3.14	4.45
30	13.07	.....	2.82	2.92	1.64	1.58	1.41	3.02	1.55	1.82	3.04	3.65
31	8.02	.....	2.89	.....	2.10	.....	1.40	2.66	.....	1.80	.....	3.60

NOTE.—Relation of gage height to discharge probably not affected by ice during 1911.

POCOTALIGO RIVER AT SISSONVILLE, W. VA.

Location.—At the highway bridge at the post office at Sissonville, W. Va., one-fourth mile below the mouth of Grapevine Creek.

Records available.—June 26, 1908, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Standard chain gage attached to bridge; datum unchanged since established.

Channel.—Practically permanent.

Discharge measurements.—Made from downstream side of bridge or by wading.

Floods.—The flood of June 27, 1910, reached a height of 33.0 feet by the gage datum. Some of the flood water passed around the gage.

Point of zero flow.—Levels taken August 10, 1910, indicate that there would be no flow past the gage if the stage were to fall to 1.2 feet, ±0.2 foot.

Winter flow.—The relation between gage height to discharge may be affected by ice for short periods in December, January, and February.

Artificial control.—A dam and small power plant above the station modifies the low-water flow.

Accuracy.—Sufficient data have not been obtained to permit estimates of discharge to be made.

The following discharge measurement was made by wading by C. T. Bailey: August 1, 1911: Gage height, 1.46 feet; discharge, 1.1 second-feet.

Daily gage height, in feet, of Pocotaligo River at Sissonville, W. Va., for 1911.

[B. N. Sisson, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.30	5.24	3.06	3.26	2.80	1.59	1.79	1.45	4.55	2.25	2.18	3.18
2	6.08	4.80	2.96	2.96	3.66	1.65	1.72	1.44	3.20	5.00	1.90	3.05
3	6.00	3.80	2.86	2.94	3.03	1.72	1.69	1.45	3.65	5.60	1.95	2.94
4	4.70	6.25	2.78	3.88	2.80	1.59	1.79	1.44	2.85	3.88	1.84	2.80
5	3.52	4.86	2.56	6.78	2.74	3.89	1.98	1.40	2.00	2.95	1.89	2.62
6	3.35	4.40	8.18	5.98	2.53	2.79	1.63	1.41	1.80	2.52	6.26	2.52
7	3.32	4.53	8.99	5.00	2.39	2.32	1.62	1.38	2.05	4.42	8.62	2.42
8	3.38	3.96	8.74	5.30	2.26	2.02	1.59	1.30	2.26	7.18	4.18	2.38
9	3.68	3.98	4.93	6.77	2.20	1.85	1.53	1.34	1.82	4.18	3.35	2.32
10	3.21	3.64	3.98	4.88	2.17	1.89	1.58	1.40	2.32	5.15	3.08	2.26
11	2.90	3.23	3.38	3.83	2.09	1.67	1.62	1.42	5.32	7.72	2.85	2.28
12	2.89	3.10	3.16	3.73	1.92	1.77	1.59	1.45	5.60	4.56	3.89	2.31
13	9.40	2.94	4.18	4.00	1.87	1.62	1.72	1.57	3.45	3.60	5.24	2.32
14	6.15	2.88	4.73	5.28	1.89	1.61	1.65	1.50	2.85	3.18	3.78	2.42
15	6.82	2.78	3.90	8.68	1.87	1.87	1.63	1.48	2.62	3.02	3.40	3.05
16	5.90	2.70	3.36	4.94	1.62	1.59	1.65	1.48	5.76	2.82	3.18	8.96
17	4.00	2.57	3.12	3.86	1.69	1.52	1.73	1.48	5.18	4.05	2.95	6.22
18	3.52	2.50	3.03	3.36	1.62	2.19	1.61	1.48	3.68	12.45	4.75	4.00
19	3.30	3.30	2.83	3.17	1.61	2.57	1.65	1.44	3.05	5.40	4.75	3.40
20	3.45	8.50	3.50	4.13	1.59	3.42	1.73	1.42	4.44	4.28	3.58	3.15
21	5.60	5.82	3.34	3.73	1.57	2.82	1.61	1.42	3.55	3.30	3.22	3.04
22	9.95	4.28	3.10	3.82	1.55	2.35	1.57	1.42	4.55	3.08	2.95	2.94
23	5.20	3.73	3.02	3.98	1.48	2.05	1.43	1.40	3.55	2.98	2.72	4.50
24	4.00	3.76	2.86	3.46	1.65	1.92	1.50	1.40	2.95	2.84	3.90	4.65
25	3.58	3.93	2.66	3.18	1.62	1.49	1.50	1.39	2.62	2.56	4.60	4.80
26	5.50	3.70	2.66	2.96	1.61	1.87	1.47	1.40	2.45	2.32	4.04	5.08
27	6.10	3.36	2.70	2.82	1.60	1.85	1.45	1.39	2.19	2.30	3.68	11.25
28	4.80	3.23	2.62	2.71	1.52	1.85	1.49	1.41	2.20	2.18	3.62	5.52
29	6.05	.....	2.62	2.66	1.53	1.77	1.49	1.40	3.60	2.14	3.72	3.88
30	17.87	.....	2.88	2.64	1.49	1.93	1.48	9.80	3.00	2.12	3.42	3.52
31	5.57	.....	3.38	.....	1.53	.....	1.47	15.50	.....	2.02	.....	6.80

NOTE.—Relation of gage height to discharge probably not affected by ice during 1911.

MIAMI RIVER BASIN.

MIAMI RIVER AT HAMILTON, OHIO.

Location.—At single-span highway bridge on High Street, Hamilton, Ohio.

Records available.—February 28, 1910, to December 31, 1911. Flood stages only, November 16, 1904, reported by the United States Weather Bureau.

Drainage area.—3,580 square miles.

Gage.—Vertical staff gage in two sections fastened to the retaining wall on the left side of the river about 100 feet above the bridge; upper section, placed by Weather Bureau in November, 1904, reads from 2.5 to 25.0 feet; lower section, placed by the United States Geological Survey, extends from 0.5 to 4.0 feet. Gage datum has not been changed.

Channel.—The section at the bridge shifts to some extent in floods on account of the high velocity; but the point of control a short distance below is apparently permanent.

Discharge measurements.—Made from upstream side of bridge.

Floods.—The maximum gage height was 21.2 feet March 24, 1898, according to the records of the United States Weather Bureau.

Winter flow.—Relation of gage height to discharge is at times affected by ice during very severe weather, but for short periods only, as factory wastes probably keep the temperature of the water above the freezing point.

Artificial control.—There are several power plants above the station, but all the water is returned to the river above the gage; there is little if any regulation of the flow from this source. The Miami & Erie Canal is fed by water taken from Miami River at Middletown and Miamisburg, Ohio. The amount of the diversion is not known.

Accuracy.—See note under "Artificial control." Records are considered reliable.

Discharge measurements of Miami River at Hamilton, Ohio, in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
May 2	Horton & Bailey	6.50	16,300
June 9	C. T. Bailey	1.64	[a] 987
9	....do	1.62	936

[a] Measurement made at lower bridge, not regular section.

Daily gage height, in feet, of Miami River at Hamilton, Ohio, for 1911.

[C. A. Huber, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.15	5.25	2.52	2.95	7.65	1.70	1.70	1.00	1.00	1.40	2.00	2.75
2	3.80	4.40	2.48	2.75	6.30	1.70	1.62	1.95	1.00	1.40	2.00	2.55
3	4.40	4.22	2.45	2.70	4.70	1.70	1.52	1.60	1.00	1.90	1.95	2.40
4	3.75	4.12	2.38	3.90	3.90	1.70	1.50	1.10	1.00	1.95	1.90	2.30
5	2.90	4.60	2.25	9.25	3.45	1.90	1.50	1.75	1.10	1.85	1.90	2.28
6	2.50	4.20	2.25	7.35	3.10	1.85	1.50	1.40	1.30	1.70	2.35	2.18
7	2.75	3.95	3.75	5.50	2.85	1.80	2.00	1.40	1.30	3.40	2.45	2.08
8	2.80	3.70	4.15	4.55	2.65	1.78	1.80	1.25	1.30	7.00	2.32	2.02
9	2.40	3.45	3.42	3.80	2.55	1.70	1.55	1.10	1.50	4.55	2.22	2.00
10	2.30	3.20	3.38	3.40	2.45	1.70	1.42	1.00	1.40	3.60	2.12	2.90
11	2.30	2.95	3.30	3.08	2.40	1.65	1.40	1.00	1.85	3.45	2.02	3.65
12	2.30	2.75	3.05	3.45	2.35	1.62	1.95	1.00	1.80	2.95	.....	5.15
13	3.35	2.58	2.82	4.50	2.30	1.60	1.80	0.90	1.55	2.65	2.95	7.05
14	5.95	2.52	2.65	5.80	2.25	1.55	1.70	1.05	1.90	2.35	2.90	6.10
15	6.00	3.00	2.50	4.80	2.20	1.52	1.60	1.65	2.25	2.20	2.55	5.85
16	5.20	3.55	2.40	4.15	2.20	1.50	1.55	1.50	3.30	2.20	2.38	5.40
17	4.10	3.28	2.25	3.52	2.10	1.50	1.50	1.40	3.05	3.35	2.30	4.75
18	3.40	3.02	2.40	3.15	2.08	1.50	1.50	1.40	2.70	5.10	3.20	4.05
19	3.00	3.08	2.50	3.02	2.00	1.80	1.50	1.30	2.45	4.10	5.00	3.60
20	2.75	3.35	2.50	3.20	2.00	1.70	1.45	1.20	2.15	3.25	3.90	3.25
21	3.60	3.05	2.50	3.35	1.95	1.70	1.40	1.10	1.95	2.70	3.35	3.05
22	3.50	2.90	2.45	3.22	1.92	1.70	1.32	1.00	1.78	2.65	2.80	3.00
23	3.25	2.80	2.25	3.05	1.90	1.65	1.28	1.00	1.70	2.60	2.65	3.20
24	3.00	2.78	2.15	2.85	1.90	1.60	1.25	1.00	1.58	2.50	2.65	3.00
25	2.75	2.75	2.15	2.68	1.90	1.55	1.25	1.00	1.50	2.25	3.50	3.00
26	4.35	2.90	2.15	2.52	1.82	1.68	1.25	1.00	1.40	2.18	3.50	2.98
27	5.40	2.82	2.45	2.48	1.80	1.75	1.20	1.00	1.30	2.08	2.75	3.35
28	7.15	2.65	2.55	2.40	1.80	1.90	1.18	1.20	1.30	2.00	2.80	3.50
29	7.35	.....	2.50	3.00	1.80	1.80	1.15	1.10	1.32	1.92	2.95	3.10
30	7.75	.....	2.80	3.80	1.75	1.75	1.10	1.00	1.40	1.90	3.05	2.90
31	7.00	.....	2.95	.....	1.72	.....	1.00	1.00	.....	1.90	.....	3.80

NOTE.—Observer made no report concerning ice. Relation of gage height to discharge probably not affected by ice during 1911.

Daily discharge, in second-feet, of Miami River at Hamilton, Ohio, for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	7,640	11,200	2,850	4,000	16,800	1,070	1,070	400	400	700	1,660	3,440
2	6,540	8,440	2,750	3,440	14,900	1,070	950	1,560	400	700	1,660	2,920
3	8,440	7,860	2,680	3,310	9,410	1,070	824	920	400	1,450	1,560	2,560
4	6,380	7,540	2,510	6,850	6,850	1,070	800	460	400	1,560	1,450	2,330
5	3,860	9,080	2,220	26,200	5,480	1,450	800	1,160	460	1,350	1,450	2,280
6	2,800	7,800	2,220	18,700	4,440	1,350	800	700	610	1,070	2,440	2,060
7	3,440	7,000	6,380	12,100	3,720	1,250	1,660	700	610	5,330	2,680	1,840
8	3,580	6,230	7,640	8,920	3,180	1,210	1,250	570	610	17,400	2,380	1,700
9	2,560	5,480	5,390	6,540	2,920	1,070	860	460	800	8,920	2,150	1,660
10	2,330	4,730	5,270	5,330	2,680	1,070	720	400	700	5,930	1,920	3,860
11	2,330	4,000	5,030	4,380	2,560	995	700	400	1,350	5,480	1,700	6,080
12	2,330	3,440	4,300	5,480	2,440	950	1,560	400	1,250	4,000	[a]2,850	10,900
13	5,180	3,000	3,640	8,760	2,330	920	1,250	340	860	3,180	4,000	17,600
14	13,600	2,850	3,180	13,100	2,220	860	1,070	430	1,450	2,440	3,860	14,200
15	13,800	4,150	2,800	9,740	2,100	824	920	995	2,220	2,100	2,920	13,300
16	11,100	5,780	2,560	7,640	2,100	800	860	800	5,030	2,100	2,510	11,700
17	7,480	4,970	2,220	5,690	1,880	800	800	700	4,300	5,180	2,330	9,580
18	5,330	4,210	2,560	4,580	1,840	800	800	700	3,310	10,700	4,730	7,320
19	4,150	4,380	2,800	4,210	1,660	1,250	800	610	2,680	7,480	10,400	5,930
20	3,440	5,180	2,800	4,730	1,660	1,070	750	530	1,990	4,880	6,850	4,880
21	5,930	4,300	2,800	5,180	1,560	1,070	700	460	1,560	3,310	5,180	4,300
22	5,630	3,860	2,680	4,790	1,490	1,070	628	400	1,210	3,180	3,580	4,150
23	4,880	3,580	2,220	4,300	1,450	995	594	400	1,070	3,050	3,180	4,730
24	4,150	3,530	1,990	3,720	1,450	920	570	400	896	2,800	3,180	4,150
25	3,440	3,440	1,990	3,260	1,450	860	570	400	800	2,220	5,630	4,150
26	8,280	3,860	1,990	2,850	1,290	1,040	570	400	700	2,060	5,630	4,090
27	11,700	3,640	2,680	2,750	1,250	1,160	530	400	610	1,840	3,440	5,180
28	18,000	3,180	2,920	2,560	1,250	1,450	516	530	610	1,660	3,580	5,630
29	18,700	.....	2,800	4,150	1,250	1,250	495	460	628	1,490	4,000	4,440
30	20,200	.....	3,580	6,540	1,160	1,160	460	400	700	1,450	4,300	3,860
31	17,400	.....	4,000	.....	1,110	.....	400	400	.....	1,450	.....	6,540

[a] Interpolated.

NOTE.—Daily discharge determined by means of a discharge rating curve that is fairly well defined below 210 second-feet (gage height 0.6 foot); well defined between 250 and 66,500 second-feet (gage heights, 0.7 and 17.5 feet); and is a tangent above 62,600 second-feet (gage height, 16.8 feet), and extended as such above 66,500 second-feet (gage height, 17.5 feet).

Monthly discharge of Miami River at Hamilton, Ohio, for 1911.

[Drainage area, 3,580 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	20,200	2,330	7,570	2.11	2.43	B.
February	11,200	2,850	5,240	1.46	1.52	A.
March	7,640	1,990	3,270	.913	1.05	A.
April	26,200	2,560	6,790	1.90	2.12	B.
May	16,800	1,110	3,420	.955	1.10	A.
June	1,450	800	1,060	.296	.33	A.
July	1,660	400	815	.228	.26	A.
August	1,560	340	577	.161	.19	B.
September	5,030	400	1,290	.360	.40	A.
October	17,400	700	3,760	1.05	1.21	A.
Novemebr	10,400	1,450	3,440	.961	1.07	A.
December	17,600	1,660	5,720	1.60	1.84	B.
The year	26,200	340	3,570	.997	13.52	

NOTE.—See footnotes to tables of daily gage height and daily discharge.

DIX RIVER BASIN.

DIX RIVER NEAR BURGIN, KY.

Location.—At highway bridge on Burgin-Buena Vista pike, 4 miles from Burgin, Ky.

Records available.—July 2, 1910, to July 16, 1911, and October 1 to December 31, 1911.

Drainage area.—416 square miles.

Gage.—Staff gage attached to abutment of bridge.

Channel.—Probably permanent.

Discharge measurements.—Made by representatives of the Kentucky Geological Survey and the Madison Electric & Power Co., of Richmond, Ky.

Winter flow.—Relation of gage height to discharge ordinarily not affected by ice.

Accuracy.—This station has not been visited by United States Geological Survey engineers, but the computations of daily and monthly discharge were made by the Survey. No discharge measurements were made during 1911. The station was last visited September 20, 1910, and the accuracy of the data published in the following tables depends upon the permanency of the gage and of the conditions of flow since that date.

Cooperation.—The station was established and measurements made by representatives of the Kentucky Geological Survey and the Madison Electric & Power Co., of Richmond, Ky. The gage reader's salary is paid by the Madison Electric & Power Co., and by the State Geological Survey of Kentucky.

Daily gage height, in feet, of Dix River near Burgin, Ky., for 1911.

[C. P. Kennedy, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.5	8.95	5.05	4.3	17.35	3.65	3.3	.....	.....	3.35	3.4	4.85
2	9.2	7.3	4.95	4.2	9.95	3.65	3.2	.....	.....	3.4	3.3	4.7
3	8.1	6.85	4.8	4.35	7.85	3.6	3.1	.....	.....	3.35	3.3	4.3
4	7.3	14.05	4.75	8.7	7.4	3.45	3.0	.....	.....	3.5	3.3	4.15
5	7.1	10.4	4.7	7.6	6.05	3.35	3.0	.....	.....	3.9	3.35	4.1
6	6.9	9.5	4.75	6.5	5.6	3.8	3.0	.....	.....	3.6	5.35	4.05
7	6.6	8.65	4.9	6.95	5.3	3.85	3.0	.....	.....	3.55	10.85	3.85
8	5.75	7.75	5.35	8.35	4.95	3.65	2.95	.....	.....	3.5	6.85	3.8
9	5.8	7.9	5.45	7.3	4.7	3.5	2.9	.....	.....	3.4	5.55	3.7
10	5.7	7.15	5.3	6.65	4.55	3.45	3.2	.....	.....	3.55	5.35	3.7
11	5.65	6.85	5.1	6.5	4.4	3.4	3.3	.....	.....	3.55	5.1	3.8
12	5.45	6.45	4.95	6.8	4.3	3.2	3.55	.....	.....	3.5	10.1	4.55
13	5.35	6.1	4.8	8.7	4.25	3.1	4.4	.....	.....	5.05	6.65	9.7
14	5.3	5.8	4.6	8.25	4.15	3.05	4.1	.....	.....	4.9	6.35	11.6
15	5.3	5.65	4.6	10.55	4.05	3.0	4.7	.....	.....	5.05	5.75	15.95
16	5.2	5.3	4.55	8.5	3.95	3.0	4.2	.....	.....	5.05	5.6	13.9
17	5.1	5.0	4.5	6.65	3.9	3.0	.....	.....	.....	5.1	5.55	10.85
18	4.95	4.85	4.5	6.05	3.85	3.0	.....	.....	.....	6.0	9.5	7.7
19	4.95	5.6	4.45	5.95	3.8	3.05	.....	.....	.....	5.55	8.75	6.7
20	4.85	12.55	4.5	5.65	3.8	4.75	.....	.....	.....	5.15	6.8	6.6
21	4.8	10.5	4.4	5.55	3.75	4.6	.....	.....	.....	4.9	6.4	6.95
22	8.45	8.25	4.35	5.45	4.4	3.9	.....	.....	.....	4.75	6.1	7.0
23	8.5	7.55	4.35	5.35	4.6	3.45	.....	.....	.....	4.5	5.8	7.1
24	6.9	6.45	4.25	5.2	4.0	3.35	.....	.....	.....	4.15	5.55	7.65
25	6.55	6.0	4.2	5.0	3.95	3.3	.....	.....	.....	4.1	6.35	9.25
26	6.65	5.8	4.15	4.75	3.85	3.3	.....	.....	.....	3.85	5.0	8.8
27	7.15	5.5	4.3	4.6	3.75	3.3	.....	.....	.....	3.8	4.9	22.65
28	7.9	5.35	4.3	4.65	3.65	3.9	.....	.....	.....	3.75	4.75	11.25
29	8.1	.....	4.25	4.9	3.6	3.9	.....	.....	.....	3.7	4.7	8.25
30	11.45	.....	4.3	5.4	3.85	3.55	.....	.....	.....	3.6	5.05	8.0
31	9.15	.....	4.3	.....	3.75	.....	.....	.....	.....	3.45	.....	14.75

NOTE.—Relations of gage height to discharge probably not affected by ice during 1911.

Daily discharge, in second-feet, of Dix River near Burgin, Ky., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,030	2,720	436	219	11,800	92	50	.....	.....	55	60	372
2	2,940	1,480	404	195	3,650	92	41	.....	.....	60	50	327
3	2,020	1,220	357	232	1,840	84	33	.....	.....	55	50	219
4	1,480	8,040	342	2,500	1,540	66	26	.....	.....	71	50	184
5	1,360	4,100	327	1,660	808	55	26	.....	.....	132	55	172
6	1,240	3,220	342	1,030	627	115	26	.....	.....	84	536	162
7	1,080	2,460	388	1,270	519	124	26	.....	.....	78	4,560	124
8	684	1,760	536	2,220	404	92	23	.....	.....	71	1,220	115
9	704	1,880	572	1,480	327	71	20	.....	.....	60	608	99
10	665	1,390	519	1,110	284	66	41	.....	.....	78	536	99
11	646	1,220	452	1,030	244	60	50	.....	.....	78	452	115
12	572	1,000	404	1,190	219	41	78	.....	.....	71	3,800	284
13	536	830	357	2,500	207	33	244	.....	.....	436	1,110	3,410
14	519	704	298	2,140	184	30	172	.....	.....	388	952	5,350
15	519	646	298	4,250	162	26	327	.....	.....	436	684	10,200
16	485	519	284	2,340	142	26	195	.....	.....	436	627	7,870
17	452	420	270	1,110	132	26	.....	.....	.....	452	608	4,560
18	404	372	270	808	124	26	.....	.....	.....	786	3,220	1,730
19	404	627	257	765	115	30	.....	.....	.....	608	2,540	1,140
20	372	6,380	270	646	115	342	.....	.....	.....	468	1,190	1,080
21	357	4,200	244	608	107	298	.....	.....	.....	388	978	1,270
22	2,300	2,140	232	572	244	132	.....	.....	.....	342	830	1,300
23	2,340	1,630	232	536	298	66	.....	.....	.....	270	704	1,360
24	1,240	1,000	207	485	151	55	.....	.....	.....	184	608	1,700
25	1,060	786	195	420	142	50	.....	.....	.....	172	952	2,980
26	1,110	704	184	342	124	50	.....	.....	.....	124	420	2,580
27	1,390	590	219	298	107	50	.....	.....	.....	115	388	17,900
28	1,880	536	219	312	92	132	.....	.....	.....	107	342	4,980
29	2,020	.....	207	388	84	132	.....	.....	.....	99	327	2,140
30	5,190	.....	219	554	124	78	.....	.....	.....	84	436	1,950
31	2,900	.....	219	.....	107	.....	.....	.....	.....	66	.....	8,800

NOTE.—Daily discharge determined by means of a discharge rating curve fairly well defined between 50 and 6,550 second-feet (gage heights 0.3 and 12.7 feet). Above 6,550 second-feet the rating curve is simply an extension and discharge values above that point should therefore be used with caution.

Monthly discharge of Dix River near Burgin, Ky., for 1911.

[Drainage area, 416 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	5,190	357	1,290	3.10	3.57	C.
February	8,040	372	1,880	4.52	4.71	C.
March	572	184	315	.757	.87	B.
April	4,250	195	1,110	2.67	2.98	B.
May	11,800	84	807	1.94	2.24	B.
June	342	26	84.7	.204	.23	C.
July 1–16	327	20	86.1	.207	.12	C.
August	.....	.....	.....	.....	.....	
September	.....	.....	.....	.....	.....	
October	786	55	221	.531	.61	B.
November	4,560	50	963	2.31	2.58	B.
December	17,900	99	2,730	6.56	7.56	C.

WABASH RIVER BASIN.

WABASH RIVER AT MOUNT CARMEL, ILL.

Location.—At Southern Railway bridge at Mount Carmel, Ill., 1½ miles below mouth of White River and immediately below mouth of Patoka River.

Records available.—June 16, 1884, to November, 1904, United States Army Engineers; November, 1904, to December 31, 1911, United States Weather Bureau.

Drainage area.—Published by the United States Weather Bureau as 26,300 square miles.

Gage.—Staff gage attached to pivot pier of drawspan; datum unchanged since gage was established in 1884.

Channel.—Slightly shifting.

Discharge measurements.—Made from downstream side of bridge. There are numerous overflow openings in the railroad embankment east of the railroad bridge.

Floods.—Maximum stage published by United States Weather Bureau as 28.3 feet August 7, 1875.

Winter flow.—The relation of gage height to discharge may be affected by ice for a week or so at a time during December, January, and February.

Accuracy.—No discharge measurements were made during 1911. Sufficient data have not been obtained to enable estimates of discharge to be made.

Cooperation.—Gage heights furnished by United States Weather Bureau.

Daily gage height, in feet, of Wabash River at Mount Carmel, Ill., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	10.2	15.3	9.7	6.9	10.8	3.4	2.7	0.8	1.0	12.2	4.1	7.5
2	11.6	16.1	9.3	6.9	11.3	3.3	3.0	.8	1.0	12.2	4.0	7.3
3	13.0	16.4	8.8	6.9	11.4	3.2	3.2	.8	1.0	13.5	3.8	7.1
4	14.0	16.7	8.0	6.8	11.6	3.1	3.0	.8	1.0	14.2	3.6	7.0
5	13.6	16.6	7.1	9.4	11.8	3.0	2.7	.8	1.0	14.6	3.5	7.0
6	12.0	15.7	6.6	12.3	11.3	3.0	2.5	.8	1.7	14.6	3.5	6.8
7	10.4	13.4	6.2	13.6	10.6	3.1	2.4	.8	2.2	14.5	3.6	6.2
8	8.6	11.5	6.1	14.4	10.0	3.2	2.2	1.0	2.2	13.7	4.2	5.4
9	7.6	10.7	10.6	15.2	9.2	3.3	2.1	1.3	1.8	12.4	4.8	5.0
10	6.6	10.2	11.9	15.7	8.0	3.3	2.0	1.5	1.7	11.2	5.0	4.8
11	6.0	9.7	12.2	16.1	7.6	3.4	1.9	1.4	1.7	9.8	5.0	4.8
12	5.6	8.8	12.4	16.0	6.8	3.5	1.9	1.4	2.6	9.0	5.0	7.2
13	6.3	7.9	12.3	15.2	5.9	3.4	1.9	1.4	3.1	8.2	5.0	9.5
14	7.2	7.2	11.6	15.4	5.5	3.3	1.8	1.3	3.4	7.2	5.9	11.0
15	10.0	6.8	10.7	16.4	5.2	3.1	1.7	1.3	4.4	6.2	6.4	11.8
16	12.1	6.5	10.0	17.3	4.8	2.8	1.6	1.3	4.6	5.3	7.3	12.4
17	13.4	6.7	9.0	17.9	4.5	2.6	1.5	1.3	5.7	4.9	7.7	13.7
18	14.3	8.1	7.9	18.3	4.3	2.4	1.4	1.3	6.2	4.5	7.7	14.0
19	14.6	10.6	6.6	18.5	4.1	2.4	1.4	1.2	7.9	4.4	9.0	13.7
20	14.2	12.3	6.0	18.8	3.9	3.5	1.4	1.2	9.0	4.8	9.6	12.8
21	12.8	13.3	5.9	19.3	3.9	4.6	1.4	1.2	9.5	5.0	10.2	12.2
22	10.8	13.4	5.7	19.6	3.9	4.2	1.4	1.2	8.0	5.8	11.1	11.8
23	9.6	13.5	5.5	19.4	4.0	3.8	1.3	1.5	6.2	6.1	11.4	10.0
24	9.3	13.1	5.4	18.9	4.2	3.3	1.3	1.6	4.9	5.5	11.6	9.6
25	9.4	12.3	5.3	18.4	4.5	3.0	1.3	1.6	4.4	5.2	11.3	9.3
26	9.4	11.3	5.1	16.8	4.8	3.0	1.2	1.4	4.3	5.5	9.8	9.0
27	9.0	10.7	4.9	14.7	4.6	3.1	1.1	1.3	4.3	5.5	8.5	8.6
28	9.3	10.2	4.8	12.4	4.3	3.2	1.0	1.2	4.4	4.9	8.0	8.3
29	11.0	.....	5.0	10.5	4.0	3.0	.9	1.1	5.4	4.7	7.7	7.9
30	13.0	.....	5.8	9.8	3.7	2.7	.9	1.0	9.0	4.5	7.6	7.6
31	14.2	.....	6.6	.....	3.5	.....	.8	1.0	.....	4.3	.....	7.7

NOTE.—No report concerning ice. Relation of gage height to discharge probably not affected by ice during 1911.

EMBARRASS RIVER NEAR OAKLAND, ILL.

Location.—At highway bridge about 2 miles northwest of Oakland, Ill., on the county line road to Hindsboro and Arcola, in the northeastern part of T. 14 N., R. 10 E., about 5 miles below the mouth of Brush Creek.

Records available.—October 23, 1909, to December 31, 1911.

Drainage area.—535 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged.

Channel.—The section is at a pool; measurements to date indicate that the control has not changed.

Discharge measurements.—Made from downstream side of bridge.

Floods.—The flood of 1897 reached a height of about 24 feet by the present gage datum.

Point of zero flow.—Not determined. There was no flow past the bridge during a portion of the summer of 1908.

Winter flow.—Ice may affect the relation of gage height to discharge during portions of December, January, and February.

The following discharge measurement was made by Monk and Brown:
October 6, 1911: Gage height, 9.37 feet; discharge, 1,360 second-feet.

Daily gage height, in feet, of Embarrass River near Oakland, Ill., for 1911.

[A. J. McDanels, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.9	11.0	5.1	5.0	5.4	2.75	2.9	1.7	1.7	14.75	6.5	5.8
2	3.2	10.9	4.8	4.9	5.35	2.7	2.2	1.75	1.7	13.9	5.5	5.7
3	3.6	10.5	4.5	5.5	5.3	2.7	2.2	1.8	1.7	12.6	5.1	5.4
4	[a]3.4	10.4	4.3	5.0	5.0	4.4	2.2	1.85	1.85	11.45	4.9	5.2
5	[a]3.2	9.7	4.1	7.0	4.8	6.65	2.1	1.85	1.85	10.6	4.5	5.0
6	[a]2.9	9.4	4.1	8.8	4.4	6.3	2.1	1.8	1.95	9.75	4.6	4.9
7	[a]2.8	9.0	4.4	10.4	4.0	5.9	2.1	1.8	2.4	10.8	5.0	4.9
8	2.8	8.6	4.8	9.8	4.0	4.5	2.1	1.75	2.8	10.95	5.3	5.7
9	2.75	8.0	4.8	8.2	4.0	4.6	2.1	1.75	2.7	9.8	5.5	5.8
10	2.75	7.4	4.9	7.1	3.9	3.9	2.1	1.7	2.8	9.4	5.5	5.8
11	2.7	6.1	5.1	7.0	3.6	3.6	2.0	1.7	2.9	8.9	6.0	5.9
12	2.9	5.1	5.2	7.0	3.4	3.1	2.0	1.65	3.2	8.2	7.0	5.9
13	3.4	5.5	5.2	9.7	3.2	2.95	2.0	1.65	3.7	7.5	8.3	5.8
14	3.9	5.9	5.1	13.5	3.1	2.95	1.9	1.6	4.1	7.0	9.0	5.6
15	4.0	6.1	4.9	13.4	3.0	2.9	1.9	1.6	4.9	6.2	8.3	5.4
16	4.5	6.3	4.8	13.0	2.9	2.8	1.9	1.6	5.5	5.3	8.0	5.3
17	4.7	6.8	4.7	12.4	2.9	2.7	1.9	1.6	5.8	5.5	7.8	5.4
18	5.6	7.4	4.6	11.8	2.8	2.6	1.9	1.6	6.4	5.6	8.0	5.6
19	5.8	7.8	4.5	9.2	2.9	2.6	1.9	1.55	6.2	6.7	8.4	5.6
20	5.85	7.6	4.4	8.4	2.9	2.5	1.8	1.55	6.0	8.3	7.8	6.0
21	5.8	7.4	4.3	8.0	3.2	2.5	1.8	1.5	5.9	9.7	7.6	6.4
22	5.7	7.1	4.2	7.1	3.5	2.6	1.8	1.6	5.8	10.0	8.3	6.6
23	5.9	6.4	4.15	7.0	3.4	2.6	1.8	1.6	5.7	10.7	9.0	6.5
24	6.9	6.1	4.1	6.8	3.4	2.65	1.8	1.7	4.95	11.2	8.3	6.4
25	8.8	5.9	4.0	6.7	3.3	2.75	1.7	1.75	5.4	10.3	7.3	6.4
26	9.0	5.8	4.3	6.3	3.1	2.75	1.7	1.8	8.6	9.4	6.0	6.2
27	9.5	5.5	4.6	6.0	3.0	2.9	1.75	1.8	10.9	8.0	5.7	6.4
28	10.5	5.3	4.8	5.9	3.0	3.1	1.75	1.85	13.6	7.3	5.9	6.0
29	11.1	.....	5.2	5.6	2.9	3.1	1.7	1.8	.....	7.0	5.9	5.8
30	11.2	.....	5.1	5.4	2.8	3.0	1.7	1.8	15.2	7.5	5.8	5.8
31	11.1	.....	5.1	.....	2.75	.....	1.7	1.75	.....	7.3	.....	5.9

[a] Gage heights to top of ice Jan. 4 to 7.

NOTE.—Relation of gage height to discharge affected by ice Jan. 3 to 7. Observer reported no ice on river Jan. 8 to 14.

Daily discharge, in second-feet, of Embarrass River near Oakland, Ill., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	55	1,930	356	336	416	46	55	5	5	3,460	649	498
2	76	1,890	297	316	406	43	17	5.5	5	3,090	436	477
3	65	1,750	243	436	396	43	17	6	5	2,540	356	416
4	60	1,720	210	336	336	226	17	7	7	2,090	316	376
5	60	1,480	179	760	297	682	13	7	7	1,790	243	336
6	52	1,390	179	1,210	226	605	13	6	9	1,500	260	316
7	49	1,270	226	1,720	165	519	13	6	27	1,860	336	316
8	49	1,160	297	1,510	165	243	13	5.5	49	1,910	396	477
9	46	1,000	297	1,050	165	260	13	5.5	43	1,510	436	498
10	46	854	316	783	152	152	13	5	49	1,390	436	498
11	43	561	356	760	116	116	10	5	55	1,240	540	519
12	55	356	376	760	95	68	10	4.5	76	1,050	760	519
13	95	436	376	1,480	76	58	10	4.5	128	878	1,080	498
14	152	519	356	2,920	68	58	8	4	179	760	1,270	456
15	165	561	316	2,880	61	55	8	4	316	583	1,080	416
16	243	605	297	2,710	55	49	8	4	436	396	1,000	396
17	278	715	278	2,460	55	43	8	4	498	436	950	416
18	456	854	260	2,220	49	37	8	4	627	456	1,000	456
19	498	950	243	1,330	55	37	8	3.5	583	693	1,100	456
20	508	902	226	1,100	55	32	6	3.5	540	1,080	950	540
21	498	854	210	1,000	76	32	6	3	519	1,480	902	627
22	477	783	194	783	105	37	6	4	498	1,580	1,080	671
23	519	627	186	760	95	37	6	4	477	1,820	1,270	649
24	737	561	179	715	95	40	6	5	326	2,000	1,080	627
25	1,210	519	165	693	85	46	5	5.5	416	1,680	830	627
26	1,270	498	210	605	68	46	5	6	1,160	1,390	540	583
27	1,420	436	260	540	61	55	5.5	6	1,890	1,000	477	627
28	1,750	396	297	519	61	68	5.5	7	2,960	830	519	540
29	1,970	.....	376	456	55	68	5	6	[a]3,300	760	519	498
30	2,000	.....	356	416	49	61	5	6	3,650	878	498	498
31	1,970	.....	356	.....	46	.....	5	5.5	.....	830	.....	519

[a] Sept. 29, discharge interpolated.

NOTE.—Daily discharge determined by means of a discharge rating curve well defined between 22 and 1,450 second-feet (gage heights 2.3 and 9.6 feet). Daily discharge Jan. 3 to 7 estimated, because of ice, from climatologic records and run-off in adjacent drainage areas.

Monthly discharge of Embarrass River near Oakland, Ill., for 1911.

[Drainage area, 535 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	2,000	43	544	1.02	1.18	A.
February	1,930	356	913	1.71	1.78	A.
March	376	165	273	.510	.59	A.
April	2,920	316	1,120	2.09	2.33	A.
May	416	46	136	.254	.29	A.
June	682	32	129	.241	.27	A.
July	55	5	10.6	.020	.02	C.
August	7	3	5.08	.0095	.01	C.
September	3,650	5	628	1.17	1.30	A.
October	3,460	396	1,390	2.60	3.00	A.
November	1,270	243	710	1.33	1.48	A.
December	671	316	495	.925	1.07	A.
The year	3,650	3	525	.981	13.32	

EMBARRASS RIVER AT STE. MARIE, ILL.

Location.—At highway bridge at the north end of Main Street, Ste. Marie, Ill., about 150 yards downstream from the Cincinnati, Hamilton & Dayton Railway bridge and 2½ miles upstream from the mouth of Hickory (or North Fork) Creek.

Records available.—October 20, 1909, to December 31, 1911.

Drainage area.—1,540 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged.

Channel.—Shifting; section is at a pool and measurements to date indicate that the point of control has remained unchanged.

Discharge measurements.—Made from downstream side of highway bridge at ordinary stages, and during high water made also from the downstream side of five wooden trestles on the Cincinnati, Hamilton & Dayton Railway, northwest of the highway bridge.

Floods.—The flood of the spring of 1908 reached a height of 22.5 feet, referred to the present gage datum.

Winter flow.—Relation of gage height to discharge may be affected by ice during portions of December, January, and February.

Discharge measurements of Embarrass River at Ste. Marie, Ill., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Mar. 4	P. S. Monk	6.50	974
Oct. 31	Monk and Brown	6.84	1,100

Daily gage height, in feet, of Embarrass River at Ste. Marie, Ill., for 1911.

[Val. C. Wuerth, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	9.7	14.0	7.7	5.3	11.1	3.2	2.75	1.9	.....	18.55	6.5	6.8
2	10.2	12.4	7.15	5.0	11.7	3.05	2.65	1.85	.....	19.5	6.1	6.6
3	14.7	10.6	6.8	4.9	11.0	3.0	2.55	1.85	.....	19.55	5.8	6.4
4	10.0	9.2	6.45	13.5	10.0	2.9	2.45	1.85	.....	19.2	5.5	6.2
5	8.7	8.4	6.4	16.0	8.7	2.85	2.4	1.9	.....	18.85	6.0	6.0
6	7.6	8.85	6.3	16.7	6.5	3.0	2.3	1.9	.....	18.45	6.5	5.7
7	7.6	11.3	10.3	16.0	6.1	4.65	2.15	2.65	1.85	17.3	7.1	5.5
8	7.7	9.9	16.0	14.0	5.9	5.0	2.15	2.25	1.85	15.95	7.1	5.4
9	7.8	9.0	17.0	11.7	5.6	4.3	2.15	1.95	2.55	13.4	6.5	5.7
10	7.2	7.95	15.5	10.0	5.5	3.95	2.2	1.9	2.3	11.05	6.1	8.5
11	6.4	7.2	13.1	8.7	5.3	3.9	2.1	1.9	2.65	9.95	5.8	11.0
12	6.2	6.75	9.7	7.9	5.1	3.55	2.05	1.75	3.25	8.95	8.0	10.0
13	6.3	6.6	9.2	12.4	5.0	3.4	2.05	1.75	4.25	8.25	14.1	9.8
14	10.5	6.5	8.2	16.4	4.8	3.2	2.05	1.75	10.55	7.55	10.0	6.5
15	15.3	7.95	7.5	17.6	4.5	2.95	2.1	1.75	10.6	7.25	9.2	6.8
16	14.1	7.8	7.2	18.2	4.4	2.9	2.1	1.8	14.25	6.75	9.2	6.9
17	11.3	12.2	6.6	17.5	4.4	2.75	2.05	1.75	16.75	6.15	9.4	10.5
18	9.8	14.2	6.5	16.4	4.3	3.3	2.05	1.75	14.95	7.85	15.7	9.0
19	8.7	14.0	6.8	15.6	4.2	3.0	2.05	.....	8.15	7.95	17.0	7.6
20	8.0	14.7	6.4	16.9	4.1	2.85	2.1	.....	6.7	7.55	15.5	7.4
21	6.8	13.7	5.9	15.9	4.5	2.8	2.1	.....	6.45	7.15	13.2	9.0
22	8.2	11.7	5.6	12.5	4.1	2.55	1.95	.....	6.15	7.85	11.3	11.8
23	7.7	9.7	5.4	11.2	3.95	2.5	1.95	.....	5.45	9.85	10.0	9.6
24	7.2	9.15	5.2	9.1	3.9	2.5	1.95	.....	5.35	10.65	9.0	8.3
25	6.5	10.0	5.0	8.1	3.8	3.45	2.0	.....	5.95	10.45	8.2	7.7
26	6.4	11.7	5.0	7.5	3.65	3.0	1.9	.....	15.25	10.5	7.5	7.4
27	9.1	11.9	9.0	7.1	3.5	2.95	1.85	.....	14.95	9.45	7.2	8.1
28	15.3	8.9	8.8	7.1	3.35	2.8	1.85	.....	11.45	8.95	7.0	7.5
29	16.8	.....	6.6	7.6	3.4	3.0	1.95	.....	16.75	8.45	8.5	6.7
30	16.5	.....	6.1	10.0	3.3	2.85	1.9	.....	17.95	7.15	7.5	7.9
31	15.6	.....	5.5	.....	3.25	.....	.....	.....	.....	6.8	.....	6.5

NOTE.—Relation of gage height to discharge affected by ice from about Jan. 3 to 11. Gage heights Jan. 4 to 11 to top of ice. From July 15 to Sept. 6 observer reported a sand bar underneath the gage. From July 15 to about Aug. 19 the bar was probably covered by water and the discharge is fairly represented by the gage heights. From about Aug. 19 to Sept. 16 the observer reported "Sand-bar reading beneath gage." During this period there was probably no water over the sand bar and the reported gage heights do not give the elevation of the water surface.

Daily discharge, in second-feet, of Embarrass River at Ste. Marie, Ill., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,180	3,930	1,420	630	2,740	215	164	103	.....	5,800	992	1,100
2	2,380	3,270	1,220	555	2,990	196	156	100	.....	6,180	861	1,030
3	2,200	2,540	1,100	532	2,700	190	148	100	.....	6,210	769	959
4	2,000	1,980	976	3,720	2,300	179	140	100	.....	6,060	683	893
5	1,850	1,680	959	4,750	1,790	174	136	103	.....	5,920	830	830
6	1,650	1,850	926	5,040	992	190	129	103	.....	5,750	992	740
7	1,500	2,820	2,420	4,750	861	476	118	156	100	5,280	1,200	683
8	1,350	2,260	4,750	3,930	799	555	118	126	100	4,730	1,200	652
9	1,200	1,900	5,160	2,990	711	403	118	106	148	3,680	992	746
10	1,050	1,510	4,540	2,300	683	336	122	103	129	2,720	861	1,720
11	900	1,240	3,560	1,790	630	326	115	103	156	2,280	769	2,700
12	893	1,080	2,180	1,490	579	267	112	94	222	1,890	1,530	2,300
13	926	1,030	1,980	3,270	555	244	112	94	393	1,620	3,970	2,220
14	2,500	992	1,600	4,910	509	215	112	94	2,520	1,360	2,300	990
15	4,460	1,510	1,340	5,410	444	184	115	94	2,540	1,260	1,980	1,100
16	3,970	1,460	1,240	5,650	423	179	115	97	4,030	1,080	1,980	1,130
17	2,820	3,190	1,030	5,360	423	164	112	94	5,060	877	2,060	2,500
18	2,220	4,010	992	4,910	403	229	112	94	4,320	1,470	4,630	1,900
19	1,790	3,930	1,100	4,590	383	190	112	.....	1,590	1,510	5,160	1,380
20	1,530	4,220	959	5,120	364	174	115	.....	1,060	1,360	4,540	1,310
21	1,100	3,810	799	4,710	444	169	115	.....	976	1,220	3,600	1,900
22	1,600	2,990	711	3,320	364	148	106	.....	877	1,470	2,820	3,030
23	1,420	2,180	656	2,780	336	144	106	.....	670	2,240	2,300	2,140
24	1,240	1,960	604	1,940	326	144	106	.....	643	2,560	1,900	1,640
25	992	2,300	555	1,570	308	252	109	.....	814	2,480	1,600	1,420
26	959	2,990	555	1,340	283	190	103	.....	4,440	2,500	1,340	1,310
27	1,940	3,070	1,900	1,200	259	184	100	.....	4,320	2,080	1,240	1,570
28	4,460	1,870	1,830	1,200	236	169	100	.....	2,880	1,890	1,160	1,340
29	5,080	.....	1,030	1,380	244	190	106	.....	5,060	1,700	1,720	1,060
30	4,960	.....	861	2,300	229	174	103	.....	5,550	1,220	1,340	1,490
31	4,590	.....	683	.....	222	.....	103	.....	.....	1,100	.....	992

NOTE.—Daily discharge determined by means of a discharge rating curve poorly defined below 160 second-feet (gage height 2.7 feet); well defined between 169 and 1,870 second-feet (gage heights 2.8 and 8.9 feet); fairly well defined between 1,900 and 4,750 second-feet (gage heights 9.0 and 16.0 feet). Above 4,750 second-feet (gage height 16.0 feet) curve is extended as a tangent which starts at 2,700 second-feet (gage height 11.0 feet). Daily discharge Jan. 3 to 11 estimated, because of ice, from climatologic records and run-off in adjacent drainage areas. Daily discharge Aug. 19 to Sept. 6 estimated, because of sand bar, from comparison with run-off in adjacent drainage areas. Mean discharge Aug. 19 to 31 estimated 85 second-feet. Mean discharge Sept. 1 to 6 estimated 80 second-feet.

Monthly discharge of Embarrass River at Ste. Marie, Ill., for 1911.

[Drainage area, 1,540 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	5,080	893	2,180	1.42	1.64	B.
February	4,220	992	2,410	1.56	1.62	A.
March	5,160	555	1,600	1.04	1.20	A.
April	5,650	532	3,110	2.02	2.25	A.
May	2,990	222	791	.514	.59	B.
June	555	144	228	.148	.17	B.
July	164	100	117	.076	.09	C.
August	156	.....	95.8	.062	.07	D.
September	5,550	.....	1,640	1.06	1.18	A.
October	6,210	877	2,820	1.83	2.11	A.
November	5,160	683	1,910	1.24	1.38	A.
December	3,030	656	1,440	.935	1.08	A.
The year	6,210	.....	1,520	.987	13.38	

NOTE.—See footnotes to table of daily discharge.

EAST BRANCH OF WHITE RIVER AT SHOALS, IND.

Location.—At highway bridge between East and West Shoals, Ind., a short distance above the Baltimore & Ohio Southwestern Railroad bridge.

Records available.—June 25, 1903, to July 21, 1906; October 12, 1908, to December 31, 1911.

Drainage area.—4,900 square miles (published by United States Weather Bureau).

Gage.—Standard chain gage attached to bridge. The gage datum was raised 61 feet on January 1, 1909, so as to be the same as that used by the United States Weather Bureau.

Channel.—Solid rock; practically permanent.

Discharge measurements.—Made from downstream side of bridge.

Floods.—Maximum gage height as published by the United States Weather Bureau was 34.1 feet March 30, 1904; flood of March, 1897, said to have been 1 to 1½ feet higher.

Winter flow.—Relation of gage height to discharge affected by ice during severe winters during portions of January and February. In ordinary winters there is little if any ice at the station.

Accuracy.—Drift lodged in the channel below the gaging section, noted in Water-Supply Paper 283 as the probable cause of the change in relation of gage height to discharge during the latter part of 1910, has been assumed to have been removed by the rise of January 1 to 5, 1911, and only one discharge rating curve has been used to determine the daily discharge for 1911 published in the following table. This discharge rating curve is based on discharge measurements made during 1909, 1910, and 1911, and the form of previous curves, reverses at about 3,980 second-feet (gage height 4.5 feet), is drawn as a tangent above 17,000 second-feet (gage height, 11.0 feet), and is fairly well defined.

Cooperation.—Gage readings are furnished by the United States Weather Bureau part of the year.

Discharge measurements of East Branch of White River at Shoals, Ind., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Sept. 21	Bailey and Monk	6.40	8,180
26	C. T. Bailey	3.68	2,010

Daily gage height, in feet, of East Branch of White River at Shoals, Ind., for 1911.

[O. H. Greist and G. H. Rowe, observers.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	9.0	12.8	7.0	7.2	5.7	3.4	3.05	2.45	2.2	5.4	3.6	5.85
2	11.3	12.9	6.3	6.8	8.8	3.5	3.15	2.45	2.2	8.6	3.6	5.8
3	11.8	11.8	5.7	6.1	10.2	3.4	3.15	2.4	2.3	12.4	3.45	5.35
4	10.5	10.2	5.2	9.6	10.4	3.5	3.05	2.4	2.2	12.1	3.5	5.05
5	9.1	8.5	4.9	12.2	10.2	3.7	2.95	2.3	2.75	11.3	3.5	4.8
6	7.6	7.0	4.8	14.7	9.9	3.4	2.85	2.4	3.4	9.8	3.75	4.45
7	6.4	6.3	5.1	15.6	9.0	3.5	2.85	2.3	3.1	8.75	5.15	4.35
8	5.4	6.7	8.6	16.4	8.7	3.8	2.85	2.4	3.15	7.6	6.2	4.2
9	5.0	7.0	10.6	17.1	6.1	4.4	2.85	2.5	3.25	7.1	6.2	4.05
10	4.8	7.0	11.6	16.3	5.2	4.3	2.85	2.4	3.55	6.1	6.2	4.05
11	4.7	6.4	11.7	14.1	4.2	4.0	2.95	2.5	3.3	5.25	5.75	4.7
12	4.6	5.7	10.6	12.1	4.4	3.7	2.95	2.4	3.2	4.7	.....	6.6
13	4.9	5.3	9.4	9.1	4.4	3.4	2.85	2.4	3.4	4.4	.....	7.15
14	7.5	5.0	8.1	13.4	4.2	3.3	2.75	2.5	3.65	4.3	.....	8.8
15	9.9	4.9	6.6	16.7	4.2	3.2	2.75	2.4	3.75	.....	.....	10.9
16	12.3	4.8	5.6	16.6	4.1	3.0	2.75	2.4	3.7	.....	.....	11.0
17	12.6	4.8	5.1	17.5	3.9	3.05	2.75	2.4	4.45	.....	.....	10.6
18	11.0	5.0	4.8	18.8	3.9	3.05	2.75	2.3	6.5	5.35	.....	10.15
19	10.2	5.3	4.5	19.0	3.7	3.95	2.75	2.15	8.45	6.05	.....	9.55
20	8.7	5.9	4.5	18.3	3.7	3.65	2.75	2.3	8.35	6.5	.....	8.85
21	7.2	7.0	4.5	16.2	4.1	3.15	2.65	2.2	6.2	6.3	5.4	8.00
22	6.5	7.9	4.5	13.0	4.3	3.05	2.55	2.2	5.3	6.05	5.55	7.00
23	7.0	7.6	4.4	10.1	4.8	3.05	2.45	2.15	4.8	5.5	5.3	6.25
24	7.9	6.8	4.2	8.5	4.9	3.15	2.45	2.3	4.4	4.85	.....	5.95
25	7.7	6.4	4.2	7.5	4.7	3.25	2.45	2.2	3.95	4.3	5.35	5.7
26	7.0	6.4	4.2	6.6	4.6	3.15	2.45	2.3	3.6	4.1	5.3	5.5
27	6.3	6.8	4.2	6.0	4.2	3.05	2.45	2.2	3.45	4.0	6.0	5.5
28	6.7	7.2	4.7	5.5	4.0	2.95	2.45	2.2	3.45	3.85	5.7	5.75
29	8.0	.....	5.6	5.2	3.7	2.95	2.45	2.3	5.3	3.7	5.45	6.2
30	10.7	.....	6.5	5.1	3.6	2.95	2.45	2.2	5.65	3.65	5.5	6.45
31	12.1	.....	6.8	.....	3.6	.....	2.45	2.3	.....	3.6	.....	6.5

NOTE.—Relation of gage height to discharge probably not affected by ice during 1911.

Daily discharge, in second-feet, of East Branch of White River at Shoals, Ind., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	13,600	19,700	9,670	10,100	6,830	1,580	1,100	535	370	6,140	1,910	7,170
2	17,400	19,800	8,160	9,250	13,200	1,740	1,220	535	370	12,900	1,910	7,060
3	18,200	18,200	6,830	7,720	15,700	1,580	1,220	500	430	19,100	1,660	6,020
4	16,200	15,700	5,680	14,700	16,000	1,740	1,100	500	370	18,600	1,740	5,330
5	13,800	12,700	4,970	18,800	15,700	2,100	985	430	785	17,400	1,740	4,730
6	10,900	9,670	4,730	22,600	15,200	1,580	880	500	1,580	15,000	2,200	3,860
7	8,380	8,160	5,450	23,900	13,600	1,740	880	430	1,160	13,100	5,560	3,600
8	6,140	9,040	12,900	25,100	13,000	2,310	880	500	1,220	10,900	7,940	3,240
9	5,210	9,670	16,400	26,200	7,720	3,730	880	570	1,360	9,880	7,940	2,880
10	4,730	9,670	17,900	25,000	5,680	3,480	880	500	1,820	7,720	7,940	2,880
11	4,480	8,380	18,000	21,600	3,240	2,760	985	570	1,430	5,800	6,940	4,480
12	4,230	6,830	16,400	18,600	3,730	2,100	985	500	1,290	4,480	6,860	8,820
13	4,970	5,910	14,300	13,800	3,730	1,580	880	500	1,580	3,730	6,780	9,980
14	10,700	5,210	11,900	20,600	3,240	1,430	785	570	2,000	3,480	6,700	13,200
15	15,200	4,970	8,820	25,600	3,240	1,290	785	500	2,200	4,120	6,620	16,800
16	19,000	4,730	6,600	25,400	3,000	1,040	785	500	2,100	4,750	6,540	17,000
17	19,400	4,730	5,450	26,800	2,530	1,100	785	500	3,860	5,390	6,460	16,400
18	17,000	5,210	4,730	28,700	2,530	1,100	785	430	8,600	6,020	6,380	15,600
19	15,700	5,910	3,980	29,000	2,100	2,640	785	345	12,600	7,610	6,300	14,600
20	13,000	7,280	3,980	28,000	2,100	2,000	785	430	12,400	8,600	6,220	13,300
21	10,100	9,670	3,980	24,800	3,000	1,220	695	370	7,940	8,160	6,140	11,700
22	8,600	11,500	3,980	20,000	3,480	1,100	610	370	5,910	7,610	6,480	9,670
23	9,670	10,900	3,730	15,600	4,730	1,100	535	345	4,730	6,370	5,910	8,050
24	11,500	9,250	3,240	12,700	4,970	1,220	535	430	3,730	4,850	5,960	7,390
25	11,100	8,380	3,240	10,700	4,480	1,360	535	370	2,640	3,480	6,020	6,830
26	9,670	8,380	3,240	8,820	4,230	1,220	535	430	1,910	3,000	5,910	6,370
27	8,160	9,250	3,240	7,500	3,240	1,100	535	370	1,660	2,760	7,500	6,370
28	9,040	10,100	4,480	6,370	2,760	985	535	370	1,660	2,420	6,830	6,940
29	11,700	.....	6,600	5,680	2,100	985	535	430	5,910	2,100	6,260	7,940
30	16,500	.....	8,600	5,450	1,910	985	535	370	6,720	2,000	6,370	8,490
31	18,600	.....	9,250	.....	1,910	.....	535	430	.....	1,910	.....	8,600

NOTE.—Daily discharge interpolated Oct. 15 to 17, Nov. 12 to 20, and Nov. 24. See "Accuracy" in station description.

Monthly discharge of East Branch of White River at Shoals, Ind., for 1911.

[Drainage area, 4,900 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	19,400	4,230	11,700	2.39	2.76	B.
February	19,800	4,730	9,600	1.96	2.04	B.
March	18,000	3,240	7,760	1.58	1.82	A.
April	29,000	5,450	18,000	3.67	4.10	B.
May	16,000	1,910	6,090	1.24	1.43	A.
June	3,730	985	1,660	.339	.38	A.
July	1,220	535	790	.161	.19	B.
August	570	345	456	.093	.11	C.
September	12,600	370	3,340	.682	.76	A.
October	19,100	1,910	7,400	1.51	1.74	B.
November	7,940	1,660	5,660	1.16	1.29	C.
December	17,000	2,880	8,560	1.75	2.02	B.
The year	29,000	345	6,720	1.37	18.64	

NOTE.—See footnotes to tables of daily gage heights and daily discharge and discussion under "Accuracy" in station description.

LITTLE WABASH RIVER NEAR CLAY CITY, ILL.

Location.—At the Baltimore & Ohio Southwestern Railroad bridge about 2 miles east of Clay City, Ill., and about 5 miles above the mouth of Big Muddy Creek.

Records available.—October 3, 1908, to December 31, 1911.

Drainage area.—808 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged.

Channel.—Probably permanent. Location of point of control not known.

Discharge measurements.—Made from downstream side of bridge.

Floods.—The flood of February 8, 1909, reached a height of 23.7 feet on the gage.

Winter flow.—Ice may affect the relation between gage height and discharge during portions of December, January, and February.

Remarks.—The station is at the toe of a horseshoe bend in the river, and the ground inside the bend along the railroad is very low. During high water the Little Wabash overflows into Little Muddy Creek and in extreme high water into Big Muddy Creek, forming at such times a sheet of water 4 miles wide along the railroad; the high-water discharge at this station can not therefore be determined. Eight measurements of discharge were made at this station during 1909–1911, but estimates are withheld because of impossibility of determining the high-water discharge.

Discharge measurements of Little Wabash River near Clay City, Ill., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Mar. 2	P. S. Monk	10.84	620
Nov. 1	Monk and Brown	7.53	145

Daily gage height, in feet, of Little Wabash River near Clay City, Ill., for 1911.

[William F. Davis, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	11.1	13.9	13.9	8.4	18.4	6.6	7.7	6.0	6.0	18.7	7.7	9.3
2	10.1	10.7	10.9	8.0	18.6	6.6	7.0	6.0	6.0	19.95	7.5	8.55
3	12.0	10.0	9.6	7.9	18.5	6.3	6.3	6.1	5.95	19.55	7.3	8.3
4	15.2	8.9	9.25	8.5	18.3	6.2	6.3	6.05	6.2	19.35	7.2	8.0
5	14.6	8.6	9.3	13.1	14.9	6.1	6.3	5.95	6.4	19.35	10.3	7.9
6	11.6	8.4	9.4	15.4	10.9	6.1	6.3	6.0	6.35	19.2	12.6	7.6
7	10.0	10.2	9.7	15.5	10.7	6.5	6.2	6.05	6.4	19.0	12.3	7.5
8	8.6	12.3	15.9	10.5	8.4	7.7	6.1	6.1	6.45	18.8	11.2	7.5
9	8.4	11.8	18.0	10.0	8.2	7.3	6.1	6.1	6.9	18.2	10.4	7.65
10	8.3	11.0	18.4	8.9	8.1	7.1	6.1	6.75	8.8	16.2	9.2	7.9
11	7.9	9.4	18.4	8.6	8.0	6.9	6.1	6.8	8.85	10.5	8.5	11.4
12	7.7	9.0	14.7	8.3	8.0	6.5	6.0	6.75	9.3	9.35	.....	15.4
13	7.7	8.8	13.3	9.6	7.7	6.4	6.0	6.55	9.5	9.1	13.2	15.3
14	7.6	8.7	12.4	17.0	7.6	6.3	6.0	6.5	9.75	8.6	16.9	11.1
15	9.6	8.4	10.2	18.3	7.3	6.3	6.0	6.35	11.0	8.15	14.0	9.5
16	14.2	8.9	8.8	18.4	7.2	6.3	6.1	6.2	15.0	8.2	10.9	9.5
17	13.7	10.4	8.4	18.4	7.1	6.4	6.0	6.1	17.2	7.8	10.2	11.1
18	9.7	12.7	8.1	18.4	7.0	6.4	6.1	6.0	18.1	7.75	11.0	14.5
19	8.9	15.2	7.9	17.3	7.0	6.7	6.1	6.0	18.2	7.7	17.0	13.2
20	8.3	17.4	9.5	17.6	7.0	6.6	6.1	6.0	18.3	7.6	18.0	11.0
21	8.1	17.6	9.0	18.2	6.9	6.5	6.1	6.15	18.55	7.6	17.5	10.0
22	.....	17.1	8.3	18.3	6.8	6.4	6.1	6.6	18.4	12.4	16.4	15.15
23	8.0	14.4	8.0	17.3	6.7	6.3	6.1	6.5	14.05	13.5	15.1	16.2
24	8.0	13.1	7.8	13.8	9.0	6.3	6.1	6.5	9.8	12.2	10.4	11.4
25	8.0	12.2	7.4	9.7	8.1	6.3	6.05	6.4	9.75	11.6	9.6	10.9
26	7.9	14.0	7.5	8.7	7.5	6.5	6.0	5.95	9.8	11.0	9.2	9.5
27	8.4	14.0	9.3	8.4	7.3	9.9	6.0	6.0	15.0	9.3	8.6	9.2
28	10.6	14.0	14.3	8.4	7.0	8.3	6.0	6.0	17.2	8.35	8.6	11.0
29	14.0	.....	12.8	8.4	6.8	8.2	6.0	5.95	18.3	8.2	8.6	9.2
30	17.4	.....	11.2	8.7	6.7	8.1	6.0	6.0	18.6	7.45	9.3	10.1
31	17.0	.....	9.0	15.7	6.6	.....	6.0	5.95	.....	7.5	.....	10.5

NOTE.—Relation of gage height to discharge probably not affected by ice during 1911.

LITTLE WABASH RIVER NEAR GOLDEN GATE, ILL.

Location.—At Southern Railway bridge about 1 mile west of Golden Gate, Ill., and 1 mile below the mouth of Elm Creek.

Records available.—August 17, 1908, to December 31, 1911.

Drainage area.—1,780 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged.

Channel.—Probably permanent. Location of control not known.

Discharge measurements.—Made from downstream side of the bridge and, at high stages, also from downstream side of three wooden trestles east of the gaging station.

Floods.—The flood of May, 1908, reached a height of about 29.2 feet on the present gage datum.

Winter flow.—Ice may affect the relation between gage height and discharge during portions of December, January, and February.

Accuracy.—Backwater affects the relation of gage height to discharge at this station and, although 20 measurements of discharge have been made at this point during 1908–1911, no reliable estimates can be made.

Discharge measurements of Little Wabash River near Golden Gate, Ill., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Mar. 7	P. S. Monk	6.50	756
8	do	9.81	1,490
Oct. 30	Monk and Brown	4.71	294

Daily gage height, in feet, of Little Wabash River near Golden Gate, Ill., for 1911.

[Ben Chalcraft, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	10.4	14.9	16.5	8.4	15.4	4.8	6.2	1.8	1.8	15.5	4.0	7.1
2	11.6	14.4	16.3	6.1	19.2	3.8	4.4	1.9	1.8	15.9	3.8	7.9
3	12.5	13.7	14.7	5.2	20.4	3.0	3.6	1.9	1.7	16.1	3.7	6.9
4	12.6	11.4	11.3	5.0	21.1	3.1	3.4	1.9	1.7	16.5	3.6	6.5
5	12.0	7.6	8.4	9.2	21.6	3.0	3.0	1.9	1.9	17.5	3.5	6.0
6	11.9	6.0	6.8	13.6	21.6	3.2	3.6	2.0	3.0	20.0	3.8	5.6
7	11.8	7.4	6.3	15.6	21.4	3.2	2.3	2.0	4.7	23.4	7.4	5.2
8	9.0	8.9	9.7	16.8	20.3	4.1	2.3	2.1	4.1	24.2	8.2	4.9
9	7.5	10.2	14.0	14.0	19.7	3.8	2.2	2.0	3.9	24.3	9.6	4.2
10	6.6	11.1	15.5	11.5	16.4	3.6	2.2	2.0	5.0	24.2	11.5	5.7
11	5.7	9.7	15.8	8.2	11.1	4.0	2.2	2.0	4.1	24.0	12.2	8.9
12	6.2	7.4	15.8	6.3	7.4	3.8	2.3	1.9	4.1	23.7	11.8	11.2
13	6.5	6.3	16.0	9.3	6.4	3.6	2.8	2.6	4.7	23.2	13.3	15.0
14	7.2	5.8	16.1	16.5	4.4	3.4	3.1	2.4	5.0	22.7	13.8	16.2
15	11.1	5.1	16.3	19.4	4.3	2.6	3.0	2.2	5.3	21.3	13.0	16.8
16	12.8	5.6	16.0	19.7	4.1	2.4	2.5	2.0	5.1	20.2	14.7	16.4
17	12.9	7.3	13.3	19.9	4.0	2.4	2.3	1.9	8.5	17.0	14.4	13.1
18	12.0	9.1	8.3	19.8	3.8	2.5	2.2	1.9	12.2	11.5	13.8	13.9
19	11.0	14.7	5.8	20.1	3.7	4.1	2.2	1.9	13.9	7.9	13.0	14.1
20	8.2	17.3	5.4	20.9	3.6	5.8	2.1	1.9	14.4	6.5	12.2	13.8
21	6.6	18.0	6.2	21.2	3.5	8.0	2.2	1.8	15.0	4.6	13.4	12.3
22	6.0	18.6	5.8	21.1	3.5	6.4	2.0	1.8	15.1	4.8	14.4	11.8
23	6.2	18.9	5.5	20.8	3.3	4.2	2.0	1.8	15.0	4.9	14.3	13.2
24	6.4	18.8	5.5	20.3	3.2	3.5	2.0	1.8	14.8	4.1	13.9	13.4
25	5.8	18.4	5.4	19.8	4.3	3.2	1.9	2.3	14.2	3.9	11.4	13.1
26	6.2	17.9	5.5	19.3	4.8	3.3	2.0	2.2	11.1	7.2	8.3	12.8
27	6.6	17.6	5.8	18.0	4.5	5.8	1.9	2.1	11.4	8.5	7.4	11.0
28	8.9	17.3	6.4	14.0	3.6	8.4	1.9	2.0	13.3	7.5	6.2	8.6
29	12.1	.....	9.4	9.0	3.3	8.8	1.8	2.0	14.2	5.5	6.7	8.1
30	14.0	.....	11.0	13.6	3.1	7.7	1.8	1.9	14.9	4.7	6.2	8.9
31	14.9	.....	10.3	.....	4.0	.....	1.8	1.9	.....	4.2	.....	9.4

NOTE.—Observer reported river full of "loose" ice Jan. 5, and full of "floating ice" Jan. 6. Relation of gage height to discharge probably not affected by ice during 1911.

LITTLE WABASH RIVER AT CARMI, ILL.

Location.—At highway bridge at northeast edge of Carmi, Ill., about one-fourth mile below the Big Four and Louisville & Nashville Railroad bridges, and about 4½ miles below the mouth of Skillet Fork River.

Records available.—October 9, 1908, to December 31, 1911.

Drainage area.—3,090 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged.

Channel.—Probably permanent. Location of control not known.

Discharge measurements.—Made from downstream side of bridge.

Floods.—The following high-water marks have been preserved: 1875, 33.5 feet; about 1895, 34.0 feet; 1897, 34.5 feet; 1898, 36.0 feet; all based on present gage datum. These gage heights are authentic, but there is a possibility that some of the dates are erroneous.

Winter flow.—Ice does not affect the flow in ordinary winters.

Accuracy.—Backwater exists at this station and reliable estimates of discharge can not be made.

Discharge measurements of Little Wabash River at Carmi, Ill., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Mar. 6	P. S. Monk	5.14	1,340
Oct. 26	Monk and Brown	2.66	362

Daily gage height, in feet, of Little Wabash River at Carmi, Ill., for 1911.

[Noah Weigant, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.7	9.0	14.45	6.3	20.6	2.45	4.30	1.75	1.75	9.6	2.75	4.4
2	7.3	10.1	13.2	4.8	20.3	2.5	3.45	1.90	1.75	10.6	2.6	4.05
3	8.3	10.1	12.0	3.9	19.65	2.5	2.85	1.80	1.75	10.9	2.4	3.9
4	8.5	9.8	10.4	3.3	19.4	2.5	2.50	1.75	1.8	10.95	2.3	3.7
5	8.7	8.95	8.1	3.65	19.95	2.6	2.30	1.70	1.8	11.4	2.25	3.45
6	8.5	8.8	5.7	6.8	20.45	2.9	2.25	1.90	1.95	12.0	2.35	3.05
7	7.8	9.3	4.75	9.5	20.75	2.6	2.15	1.80	2.2	12.75	2.4	2.9
8	6.95	9.85	5.9	11.4	20.75	2.4	2.05	1.75	2.5	13.8	2.5	2.75
9	5.65	10.2	7.8	11.8	20.45	2.5	1.95	1.70	2.65	14.8	2.7	2.65
10	4.4	10.35	10.15	10.75	19.6	3.1	1.9	1.70	2.75	15.9	5.6	2.65
11	3.65	10.1	11.45	9.3	17.75	2.8	1.85	1.8	3.05	17.2	6.3	2.85
12	3.45	9.45	11.85	7.9	13.2	2.6	1.8	1.85	2.85	17.7	5.8	3.4
13	3.3	8.05	11.4	8.05	8.0	2.4	1.8	1.85	2.8	17.3	4.6	7.65
14	3.0	6.15	10.8	17.0	4.32	2.25	1.8	1.9	2.9	17.15	4.7	8.15
15	4.1	4.75	10.4	18.15	3.18	2.15	2.0	1.9	3.1	16.75	7.6	8.9
16	5.9	3.65	9.55	18.1	2.9	2.05	2.05	1.9	3.2	16.4	9.1	9.3
17	7.1	4.05	8.45	18.55	2.65	2.0	2.05	1.95	3.8	15.3	9.35	9.4
18	7.6	5.05	7.1	19.2	2.5	2.4	2.0	1.95	4.15	13.15	9.05	9.35
19	7.6	8.6	5.35	19.7	2.4	2.8	1.9	1.95	6.55	10.10	8.3	9.1
20	6.9	14.95	3.65	20.45	2.3	3.1	1.85	1.95	8.4	7.9	7.45	9.05
21	5.65	16.1	3.15	20.4	2.25	3.3	1.8	1.9	9.05	5.95	7.9	9.3
22	4.45	16.2	3.05	20.35	2.25	4.0	1.8	1.9	9.35	4.35	8.3	9.75
23	3.85	16.4	3.25	20.35	2.25	3.5	1.7	1.9	9.4	3.3	8.95	10.3
24	3.65	16.75	3.1	20.0	2.2	2.95	1.7	1.9	9.05	2.75	8.85	10.65
25	3.65	16.95	3.0	19.2	2.3	2.55	1.7	1.85	8.65	2.45	8.15	10.9
26	3.65	16.85	2.9	17.85	2.4	2.3	1.7	1.85	6.05	2.5	7.1	10.35
27	3.7	16.4	2.9	16.45	2.5	2.25	1.65	1.85	6.65	3.5	5.4	9.0
28	4.15	15.5	2.9	14.8	2.5	2.4	1.65	1.8	6.55	4.1	4.3	6.8
29	5.35	.....	3.5	13.05	2.45	3.9	1.70	1.8	7.35	3.7	3.7	5.05
30	6.7	.....	5.7	13.65	2.4	4.7	1.70	1.8	9.0	3.3	3.3	4.55
31	7.9	.....	6.85	.....	2.4	.....	1.70	1.8	.....	3.0	.....	5.15

NOTE.—Relation of gage height to discharge was not affected by ice during 1911.

SKILLET FORK RIVER NEAR WAYNE CITY, ILL.

Location.—At Southern Railway bridge 1 mile east of Wayne City, Ill., about 4 miles below the mouth of Horse Creek.

Records available.—August 16, 1908, to December 31, 1911.

Drainage area.—481 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged.

Channel.—Permanent, rough; remains of rock dam at section. Point of control at section.

Discharge measurements.—Made from downstream side of bridge, and in high water also from downstream side of wooden railroad trestle about 1 mile east of main channel. Low-water measurements are made about 600 feet below regular section by wading or from a boat.

Floods.—Maximum gage height since establishment of gage, 21.8 feet, on March 11, 1909. No records previous to establishment of gage are available.

Point of zero flow.—A determination by leveling October 28, 1911, indicates that there would be no flow past the gage if the river stage were to fall to about 1.5 feet, as referred to the gage datum.

Winter flow.—Ice may affect the relation between gage height and discharge during portions of December, January, and February.

Discharge measurements of Skillet Fork River near Wayne City, Ill., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
1911.		*Feet.*	*Sec.-feet.*
Mar. 8	P. S. Monk	11.87	1,150
Oct. 29	Monk and Brown	2.60	[a] 19

[a] Measurement made by wading just above the regular section.

Daily gage height, in feet, of Skillet Fork River near Wayne City, Ill., for 1911.

[Evert Higdon, Jan.–Sept.; Geo. A. Johnson, Oct.–Dec., observers.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec
1	4.3	4.6	6.8	3.3	20.1	2.4	2.6	1.95	.....	8.5	2.4	3.7
2	8.1	3.4	5.3	3.0	20.5	2.4	2.5	2.1	.....	8.2	2.4	3.6
3	4.8	3.0	4.9	2.9	20.1	2.4	2.4	2.1	.....	11.05	2.4	3.2
4	4.5	2.7	4.6	3.3	19.5	2.4	2.4	2.1	.....	12.2	2.4	3.0
5	5.0	2.3	4.3	12.9	14.9	2.4	2.3	2.1	.....	10.05	(a)	2.8
6	4.6	4.8	4.0	14.7	7.3	2.9	2.3	2.4	.....	5.65	.....	2.8
7	3.0	5.2	5.8	12.0	3.8	7.3	2.2	2.4	.....	3.65	.....	2.8
8	2.9	5.5	9.8	7.1	3.5	4.3	2.2	2.3	.....	4.25	.....	2.7
9	2.7	5.4	11.0	4.2	3.1	3.1	2.2	2.3	3.0	3.75	.....	3.6
10	2.7	4.6	11.3	3.9	2.9	2.9	2.2	2.3	4.4	4.4	.....	6.5
11	2.65	3.5	7.5	3.3	2.8	2.7	2.1	2.3	5.5	3.4	.....	9.9
12	2.3	3.1	5.25	3.2	2.6	2.5	2.1	2.2	3.8	3.1	6.4	10.1
13	3.0	2.9	4.7	7.9	2.5	2.4	2.1	2.2	3.0	2.7	11.8	9.2
14	3.65	3.0	3.8	19.2	2.7	2.4	2.1	2.2	2.8	2.6	10.2	6.5
15	3.8	3.4	3.3	19.6	2.6	2.3	2.0	2.2	2.8	2.5	7.3	5.2
16	3.9	4.3	3.0	18.9	2.6	2.3	2.0	2.2	5.3	2.5	5.4	5.6
17	3.95	4.4	3.0	15.7	2.5	2.3	2.0	2.1	7.2	2.4	4.6	9.6
18	3.9	5.65	2.9	7.7	2.5	2.3	2.0	2.1	9.8	2.5	7.5	9.2
19	3.1	8.9	2.85	6.0	2.5	2.4	2.0	2.1	7.8	2.4	8.6	6.5
20	2.9	18.7	2.75	10.4	2.5	2.8	2.0	2.1	8.9	2.4	6.4	5.7
21	2.9	17.6	2.85	10.5	2.5	2.6	2.0	2.1	6.8	2.5	5.5	10.5
22	2.8	13.5	2.8	9.6	2.5	2.5	2.0	2.2	5.3	2.5	4.7	13.1
23	2.85	9.8	2.8	5.2	2.5	2.5	2.0	(b)	3.5	2.6	3.8	12.5
24	2.8	7.6	2.75	4.0	2.4	2.4	2.0	.....	3.0	2.5	4.5	9.3
25	2.8	8.9	2.7	3.3	2.4	2.5	2.0	.....	2.8	2.7	4.8	6.8
26	3.2	8.7	2.7	3.1	2.4	3.1	2.0	.....	7.3	3.1	4.1	5.0
27	3.5	8.9	5.5	2.9	2.3	4.4	1.95	.....	10.0	2.8	3.8	5.2
28	5.0	8.7	7.9	3.0	2.3	4.3	1.95	.....	9.2	2.7	4.2	5.6
29	7.1	.....	6.8	4.1	2.3	3.2	1.95	.....	12.0	2.5	4.9	5.1
30	7.0	.....	5.0	18.0	2.3	2.8	1.95	.....	14.6	2.5	3.9	4.4
31	6.8	.....	3.9	.....	2.3	.....	1.95	.....	.....	2.5	.....	6.6

[a] Nov. 5 to 11, observer lost report. [b] Aug. 23 to Sept. 8, gage chain stolen.

NOTE.—Relation of gage height to discharge probably not affected by ice during 1911.

Daily discharge, in second-feet, of Skillet Fork River near Wayne City, Ill., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	137	160	343	62	5,900	5	14	0.2	.....	535	5	92
2	487	70	212	40	6,320	5	9	.5	.....	499	5	85
3	175	40	182	32	5,900	5	5	.5	.....	960	5	55
4	152	19	160	62	5,300	5	5	.5	.....	1,230	5	40
5	190	3	137	1,430	2,180	5	3	.5	.....	769	5	25
6	160	175	115	2,090	398	32	3	5	.....	238	54	25
7	40	205	250	1,180	100	398	1	5	.....	88	240	25
8	32	227	726	376	77	137	1	3	20	134	340	19
8	19	220	950	130	47	47	1	3	40	96	350	85
10	19	160	1,010	107	32	32	1	3	145	145	390	313
11	16	77	420	62	25	19	.5	3	227	70	450	742
12	3	47	208	55	14	9	.5	1	100	47	303	778
13	40	32	167	464	9	5	.5	1	40	19	1,130	630
14	88	40	100	5,000	19	5	.5	1	25	14	796	313
15	100	70	62	5,400	14	3	.3	1	25	9	398	205
16	107	137	40	4,700	14	3	.3	1	212	9	220	235
17	111	145	40	2,550	9	3	.3	.5	387	5	160	694
18	107	238	32	442	9	3	.3	.5	726	9	420	630
19	47	586	28	265	9	5	.3	.5	453	5	547	313
20	32	4,520	22	832	9	25	.3	.5	586	5	303	242
21	32	3,640	28	850	9	14	.3	.5	343	9	227	850
22	25	1,630	25	694	9	9	.3	1	212	9	167	1,490
23	28	726	.25	205	9	9	.3	.....	77	14	100	1,310
24	25	431	22	115	5	5	.3	.....	40	9	152	646
25	25	586	19	62	5	9	.3	.....	25	19	175	343
26	55	559	19	47	5	47	.3	.....	398	47	122	190
27	77	586	227	32	3	145	.2	.....	760	25	100	205
28	190	559	464	40	3	137	.2	.....	630	19	130	235
29	376	.....	343	122	3	55	.2	.....	1,180	9	182	197
30	365	.....	190	3,930	3	25	.2	.....	2,050	9	107	145
31	343	.....	107	.....	3	.....	.2	.....	.....	9	.....	323

NOTE.—Daily discharge determined by means of a discharge rating curve fairly well defined between 1.0 and 1,180 second-feet (gage heights 2.2 and 12.0 feet), and poorly defined above 1,180 second-feet (gage height 12.0 feet). Daily discharge Aug. 23 to Sept. 8 and Nov. 5 to 11 estimated, because of gage heights missing from observer's notes, by comparison with gage heights at Mill Shoals and discharge of adjacent drainage areas. Mean discharge Aug. 23 to Sept. 7 estimated 1 second-foot.

Monthly discharge of Skillet Fork River near Wayne City, Ill., for 1911.

[Drainage area, 481 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	487	3	116	0.241	0.28	B.
February	4,520	3	567	1.18	1.23	B.
March	1,010	19	215	.447	.52	B.
April	5,400	32	1,050	2.18	2.43	C.
May	6,320	3	853	1.77	2.04	C.
June	398	3	40.2	.084	.09	C.
July	14	.2	1.60	.0033	.004	D.
August [a]	5	.....	1.35	.0028	.003	D.
September [a]	2,050	.....	290	.603	.67	C.
October	1,230	5	163	.339	.39	B.
November [a]	1,130	5	253	.526	.59	B.
December	1,490	19	370	.769	.89	B.
The year	6,320	.....	324	.674	9.14	

[a] See footnotes to table of daily discharge.

SKILLET FORK RIVER NEAR MILL SHOALS, ILL.

Location.—At Baltimore & Ohio Southwestern Railroad bridge about 1 mile south of Mill Shoals, Ill., and 1½ miles below the mouth of Griffin Creek.

Records available.—October 9, 1908, to December 31, 1911.

Drainage area.—912 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged.

Channel.—Probably permanent; old piles in bottom affect measurements at low stages. Point of control at section.

Discharge measurements.—Made from top of downstream plate girder of bridge and long wooden trestle approaches at each end.

Floods.—Maximum gage height since establishment of gage is 24.4, which occurred March 14, 1909. No records of floods previous to establishment of gage are available.

Point of zero flow.—Estimated to be at 1.0 foot gage height, from an examination of the station at low water.

Winter flow.—Ice may affect the relation between gage height and discharge during portions of December, January, and February.

Accuracy.—Backwater exists at this station and reliable estimates of flow can not be made, although 17 measurements of discharge were made during 1909–1911.

Discharge measurements of Skillet Fork River near Mill Shoals, Ill., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Mar. 3	P. S. Monk	8.61	561
9	do	12.15	1,320
Oct. 27	Monk and Brown	1.88	[a]8.1

[a] Measurement made from temporary bridge about 100 feet below the section.

Daily gage height, in feet, of Skillet Fork River near Mill Shoals, Ill., for 1911.

[John A. Clow, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	8.8	7.6	12.6	6.0	17.5	2.0	3.0	1.4	1.8	12.1	2.0	5.5
2	9.6	5.1	.....	5.3	19.8	2.0	2.9	1.4	1.8	11.9	2.0	5.3
3	10.6	5.0	8.4	4.8	20.5	1.9	2.6	1.4	1.8	11.5	1.8	5.0
4	9.7	4.9	7.0	4.9	21.4	2.0	2.1	1.4	1.8	11.9	1.8	4.9
5	8.6	5.1	6.7	7.6	21.7	2.2	2.0	1.4	2.4	12.1	1.8	4.8
6	7.4	6.8	6.4	11.3	21.4	2.4	2.0	1.4	2.8	11.5	1.9	3.8
7	5.7	7.9	7.5	13.5	21.2	2.9	2.0	1.4	3.0	.....	2.7	3.0
8	4.8	7.8	10.3	12.4	20.1	5.9	2.0	1.4	3.4	6.0	7.0	2.9
9	3.0	7.5	12.5	11.6	19.7	.....	1.9	1.4	4.0	6.3	8.0	2.6
10	3.1	6.9	12.7	8.3	18.1	3.9	2.6	1.5	4.7	6.6	7.8	2.4
11	3.9	6.1	12.0	7.6	15.9	3.7	4.9	1.6	5.3	6.9	8.1	4.8
12	4.1	5.1	9.3	5.2	11.3	3.0	3.9	1.7	5.7	7.6	8.7	7.7
13	4.2	4.9	7.0	13.9	6.1	2.9	3.4	1.7	4.9	7.5	7.3	10.7
14	3.1	4.8	6.0	15.6	5.2	2.8	3.0	1.7	4.6	7.0	10.2	9.8
15	3.0	5.1	5.6	18.3	4.9	2.4	2.9	1.7	4.4	6.3	9.8	8.7
16	3.0	5.9	4.5	19.0	3.5	2.0	2.6	1.8	3.8	5.7	8.9	7.0
17	.....	7.0	4.2	19.9	3.2	1.9	1.5	1.7	4.9	5.0	7.0	7.9
18	.....	8.4	4.0	20.0	3.0	2.0	1.5	1.7	8.2	3.9	8.0	10.1
19	.....	12.6	3.9	20.1	2.9	2.0	1.5	1.7	9.0	3.6	7.9	9.7
20	.....	17.0	3.8	20.2	2.9	2.0	1.5	1.7	9.0	2.4	7.6	9.0
21	.....	17.7	3.4	19.8	2.9	2.1	1.5	1.7	8.9	2.0	7.4	9.9
22	4.1	18.4	3.3	18.9	2.8	2.3	1.5	1.7	7.7	1.9	7.0	11.9
23	4.1	18.9	3.2	17.9	2.6	2.6	1.4	1.7	6.5	1.8	6.9	10.7
24	5.6	18.8	3.0	15.3	2.5	2.9	1.4	1.7	5.7	1.7	6.3	12.7
25	5.0	18.0	3.0	12.0	2.4	2.6	1.4	1.7	4.8	1.6	5.0	11.3
26	4.9	17.6	3.5	8.2	2.3	2.2	1.4	1.7	3.5	1.4	4.5	10.4
27	4.1	16.1	4.6	6.9	2.2	2.2	1.4	1.7	5.9	1.6	5.0	8.6
28	6.1	14.1	5.9	5.2	2.1	3.6	1.4	1.7	9.8	2.8	4.9	6.0
29	7.7	.....	6.8	5.6	2.1	4.9	1.4	1.7	10.3	3.0	4.6	6.0
30	8.9	.....	7.6	15.4	2.1	3.8	1.4	2.5	11.4	2.9	4.5	6.0
31	8.6	.....	6.5	.....	2.0	.....	1.4	2.0	.....	2.5	.....	6.9

NOTE.—No record of ice kept by observer. Relation of gage height to discharge probably not affected by ice during 1911.

TENNESSEE RIVER BASIN.

FRENCH BROAD RIVER AT ASHEVILLE, N. C.

Location.—At highway bridge known as Smith's Bridge, about 1 mile below the Southern Railway station at Asheville, about 2 miles below the mouth of Swannanoa River. Smith's Bridge is one-fourth mile above the new Southern Railway bridge and about one-fourth mile below a concrete highway bridge recently completed.

Records available.—March 19, 1903, to December 31, 1911. The United States Weather Bureau has maintained a gage at this point since March 19, 1903, and during 1904 a number of discharge measurements were made by the United States Geological Survey. Since January 1, 1905, the discharge measurements have been continued by the United States Geological Survey and the gage heights have been furnished by the United States Weather Bureau.

Drainage area.—987 square miles.

Gages.—Vertical staff attached to one of the bridge piers, and an auxiliary chain gage attached to the bridge in the first panel to the left of the staff gage. The staff gage ends at zero and the chain gage is used for readings below zero. Both gages are adjusted to the same datum, which has remained unchanged since they were established.

Channel.—Practically permanent; broken by three piers of the highway bridge. Bed of river is mostly rock, but is not excessively rough. Current good at all points.

Discharge measurements.—Made from the downstream side of the highway bridge.

Floods.—The flood of August 31, 1910, reached a height of about 8.8 feet by the gage datum. Stage of 10.6—"date unknown"—reported by the United States Weather Bureau.

Winter flow.—Ice does not affect the flow.

Accuracy.—The construction of a new railroad bridge across the river about 1,500 feet below the gage in 1907–8 caused changes in channel necessitating revision of the discharge rating curve. The coffer dams caused temporary and variable changes during 1908, but since the completion of the work comparatively permanent conditions of flow have been reestablished. Data for 1911 are considered reliable.

Cooperation.—Gage heights are furnished by the United States Weather Bureau.

Discharge measurements of French Broad River at Asheville, N. C., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Aug. 5	R. E. Robertson	−0.08	1,360
7	do	− .33	1,130
7	do	− .32	[a] 1,110
Nov. 1	do	− .28	1,100

[a] Measurement made at the concrete highway bridge about one-fourth mile above the gage.

Daily gage height, in feet, of French Broad River near Asheville, N. C., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.5	−0.3	−0.1	0.0	0.9	0.1	−0.5	−0.8	0.5	−0.6	−0.4	0.0
2	1.2	− .3	.0	.0	.7	− .2	− .5	− .7	− .2	− .6	− .3	.0
3	2.2	− .3	− .1	− .1	.5	− .2	− .6	− .6	− .3	− .6	− .4	− .1
4	3.1	− .1	− .2	− .1	.4	− .3	− .6	.1	− .4	− .6	− .4	− .2
5	2.0	.0	− .2	3.2	.4	− .2	− .2	.0	− .4	− .6	− .4	− .3
6	1.1	− .1	− .2	3.9	.3	− .2	− .4	− .1	− .3	− .7	− .4	− .3
7	.8	.0	.0	3.2	.4	− .3	− .6	− .3	− .4	− .7	.4	− .3
8	.7	.0	.3	1.9	.3	.0	− .6	− .2	− .4	− .7	.1	− .3
9	.3	.9	.3	1.7	.2	− .2	− .5	− .3	− .6	− .8	.5	− .4
10	.1	1.3	.1	1.6	.2	− .3	− .6	− .6	− .6	− .7	.8	− .4
11	.1	.8	.0	1.0	.2	− .3	− .4	− .6	− .6	1.4	.3	− .4
12	.0	.5	.0	1.1	.2	− .4	− .2	− .7	− .6	.4	.2	− .3
13	.0	.4	− .1	2.9	.1	− .5	− .3	− .7	− .6	− .1	.5	− .3
14	.0	.3	.2	3.3	.3	− .5	.1	− .5	− .7	− .2	.4	− .3
15	.0	.2	.0	3.4	.2	− .5	− .4	− .6	− .7	− .5	.1	− .3
16	.0	.1	.0	3.1	.1	− .6	− .4	− .6	− .7	− .5	.1	− .1
17	.0	.1	− .1	2.3	.1	− .6	− .3	− .7	− .7	− .1	.0	.9
18	.1	.0	− .2	1.6	.0	− .6	− .4	− .7	− .8	2.9	.0	.8
19	.0	.0	− .2	1.4	.0	− .5	− .5	− .8	− .8	2.4	.5	.2
20	.0	.1	− .1	1.7	.0	− .5	− .5	− .8	− .8	.9	.2	.1
21	.0	.1	− .2	1.4	.5	− .4	− .6	− .8	− .8	.4	.0	.4
22	− .1	.0	− .3	1.1	.2	− .4	− .6	− .8	− .5	.2	− .1	1.7
23	− .1	.0	− .3	1.1	.0	− .5	− .6	− .9	.1	1.0	− .2	2.6
24	− .2	.0	− .3	.9	.5	− .5	− .7	− .9	1.7	.5	− .2	1.8
25	− .2	.0	− .3	.8	.2	− .5	− .6	− .9	.3	.1	.0	1.5
26	− .3	.0	.2	.7	.1	− .5	− .6	− .8	.0	.0	− .1	1.2
27	− .3	− .1	.8	.6	.0	− .6	− .6	− .4	− .1	− .1	− .2	1.3
28	− .2	− .1	.8	.6	.0	− .5	− .7	− .6	− .2	− .2	− .2	1.6
29	− .2	.....	.4	.6	.1	− .4	− .8	− .6	− .3	− .2	.7	1.1
30	− .2	.....	.1	.8	− .1	− .5	− .8	.3	− .4	− .3	.3	.8
31	− .2	.....	.1	.....	− .2	.....	− .8	1.5	.....	− .3	.....	.7

Daily discharge, in second-feet, of French Broad River near Asheville, N. C., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,940	1,100	1,290	1,390	2,460	1,490	920	670	1,940	830	1,010	1,390
2	2,910	1,100	1,390	1,390	2,190	1,190	920	750	1,190	830	1,100	1,390
3	4,760	1,100	1,290	1,290	1,940	1,190	830	830	1,100	830	1,010	1,290
4	6,900	1,290	1,190	1,290	1,820	1,100	830	1,490	1,010	830	1,010	1,190
5	4,350	1,390	1,190	7,160	1,820	1,190	1,190	1,390	1,010	830	1,010	1,100
6	2,750	1,290	1,190	9,070	1,710	1,190	1,010	1,290	1,100	750	1,010	1,100
7	2,320	1,390	1,390	7,160	1,820	1,100	830	1,100	1,010	750	1,820	1,100
8	2,190	1,390	1,710	4,150	1,710	1,390	830	1,190	1,010	750	1,490	1,100
9	1,710	2,460	1,710	3,770	1,600	1,190	920	1,100	830	670	1,940	1,010
10	1,490	3,070	1,490	3,590	1,600	1,100	830	830	830	750	2,320	1,010
11	1,490	2,320	1,390	2,600	1,600	1,100	1,010	830	830	3,240	1,710	1,010
12	1,390	1,940	1,390	2,750	1,600	1,010	1,190	750	830	1,820	1,600	1,100
13	1,390	1,820	1,290	6,390	1,490	920	1,100	750	830	1,290	1,940	1,100
14	1,390	1,710	1,600	7,420	1,710	920	1,490	920	750	1,190	1,820	1,100
15	1,390	1,600	1,390	7,690	1,600	920	1,010	830	750	920	1,490	1,100
16	1,390	1,490	1,390	6,900	1,490	830	1,010	830	750	920	1,490	1,290
17	1,390	1,490	1,290	4,980	1,490	830	1,100	750	750	1,290	1,390	2,460
18	1,490	1,390	1,190	3,590	1,390	830	1,010	750	670	6,390	1,390	2,320
19	1,390	1,390	1,190	3,240	1,390	920	920	670	670	5,200	1,940	1,600
20	1,390	1,490	1,290	3,770	1,390	920	920	670	670	2,460	1,600	1,490
21	1,390	1,490	1,190	3,240	1,940	1,010	830	670	670	1,820	1,390	1,820
22	1,290	1,390	1,100	2,750	1,600	1,010	830	670	920	1,600	1,290	3,770
23	1,290	1,390	1,100	2,750	1,390	920	830	590	1,490	2,600	1,190	5,660
24	1,190	1,390	1,100	2,460	1,940	920	750	590	3,770	1,940	1,190	3,960
25	1,190	1,390	1,100	2,320	1,600	920	830	590	1,710	1,490	1,390	3,410
26	1,100	1,390	1,600	2,190	1,490	920	830	670	1,390	1,390	1,290	2,910
27	1,100	1,290	2,320	2,060	1,390	830	830	1,010	1,290	1,290	1,190	3,070
28	1,190	1,290	2,320	2,060	1,390	920	750	830	1,190	1,190	1,190	3,590
29	1,190	.....	1,820	2,060	1,490	1,010	670	830	1,100	1,190	2,190	2,750
30	1,190	.....	1,490	2,320	1,290	920	670	1,710	1,010	1,100	1,710	2,320
31	1,190	.....	1,490	.....	1,190	.....	670	3,410	.....	1,100	.....	2,190

NOTE.—Daily discharge determined by means of a discharge rating curve well defined between 920 and 10,800 second-feet (gage heights −0.5 and 4.5 feet).

Monthly discharge of French Broad River near Asheville, N. C., for 1911.

[Drainage area, 987 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	6,900	1,100	1,890	1.91	2.20	A.
February	3,070	1,100	1,540	1.56	1.62	A.
March	2,320	1,100	1,420	1.44	1.66	A.
April	9,070	1,290	3,790	3.84	4.28	A.
May	2,460	1,190	1,630	1.65	1.90	A.
June	1,490	830	1,020	1.03	1.15	B
July	1,490	670	915	.927	1.07	C.
August	3,410	590	966	.979	1.13	C.
September	3,770	670	1,100	1.11	1.24	C.
October	6,390	670	1,590	1.61	1.86	B.
November	2,320	1,010	1,470	1.49	1.66	A.
December	5,660	1,010	1,990	2.02	2.33	A.
The year	9,070	590	1,530	1.55	22.10	

TENNESSEE RIVER AT KNOXVILLE, TENN.

Location.—At county highway bridge at Gay Street, in the city of Knoxville, about 4 miles below the junction of French Broad and Holston rivers.

Records available.—January 17, 1899, to December 31, 1911. The United States Weather Bureau began river observations February 1, 1883, but the earlier gage-height records are not continuous. For a number of years prior to 1899 daily gage readings were made for about one-half of the year, including the winter season.

Drainage area.—8,990 square miles.

Gage.—Vertical gage on one of the county bridge piers; used since January 1, 1909. The original gage on a pier of the old bridge at the same site was used prior to 1899. During construction of the new bridge, January 17, 1899, the gage was removed to the Knoxville & Augusta Railroad bridge one-half mile downstream. Later during the same year a more permanent gage was installed, 1,000 feet still farther downstream at a point on the right bank just below the mouth of West Knoxville Bayou. This gage was set to read the same as the original gage, having its zero point 2.3 feet lower than that of the original gage on account of fall in the river. All gage heights for 1899 were adjusted to conform to this gage, and it was used continuously until December 31, 1908. The present gage at the county bridge reads the same at low stages as the one it supersedes, but the two gages do not read the same at higher stages. A relation based on comparative readings has been computed by the United States Weather Bureau, and has been applied to the discharge rating curve to adapt it to the present gage.

Channel.—Wide and relatively shallow, with rough, rocky bottom. Permanency of flow will depend upon the permanency of some river-improvement wing dams below.

Discharge measurements.—Made from the downstream side of the bridge, floor of which is about 100 feet above water.

Floods.—The flood of March, 1875, reached a height of about 39.0 feet by the gage datum (United States Weather Bureau publication).

Point of zero flow.—Assuming that the improved boat channels below the station are 3.0 feet deep at low water, according to the plan for that portion of the river, there would be no flow past the gage if the river stage were to fall to about 4.5 feet below the gage datum.

Winter flow.—Ice does not affect the flow.

Accuracy.—The discharge rating curve for the present gage is based chiefly on the curve for the former gage adjusted according to the relative readings of the two gages. Discharge measurements made during 1909 and 1911, referred to the present gage, agree well with the derived curve, but all parts of the curve have not yet been verified by discharge measurements. Estimates of discharge are withheld from publication for the present. (See Water-Supply Paper No. 283.)

Cooperation.—Gage heights are furnished by the United States Weather Bureau.

Discharge measurements of Tennessee River at Knoxville, Tenn., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Nov. 2	R. E. Robertson	0.60	4,370
27	do	1.70	8,930

Daily gage height, in feet, of Tennessee River at Knoxville, Tenn., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.2	5.5	1.8	2.4	3.8	0.9	1.5	−0.5	1.1	0.2	0.6	1.1
2	4.7	3.7	1.8	2.4	5.5	.9	1.0	− .5	1.9	.2	.5	1.1
3	7.7	2.8	1.8	2.3	4.4	1.0	.6	− .4	1.5	.7	.5	1.0
4	11.6	2.8	1.8	2.3	3.9	1.0	.3	.0	1.3	.1	.3	.9
5	11.0	4.0	1.8	6.1	3.0	1.0	.3	.0	.5	.8	.1	.8
6	7.1	4.3	1.8	13.6	2.7	.9	.0	.4	.4	.9	.2	.8
7	4.1	3.4	4.1	14.2	2.4	.9	.0	1.0	.9	.5	.6	.7
8	3.1	3.7	11.6	11.4	2.3	1.1	− .1	.8	.6	.2	1.1	.6
9	2.8	10.2	14.5	8.6	2.1	1.0	.4	1.0	.2	.0	1.8	.4
10	2.2	13.2	10.8	7.2	2.1	1.0	1.5	1.0	.0	.0	1.9	.4
11	2.1	11.6	6.6	7.1	2.0	.9	1.8	.6	− .3	1.0	1.8	.2
12	2.0	8.4	4.5	5.4	1.9	.9	1.2	.2	− .4	1.2	1.7	.0
13	1.8	5.3	3.6	4.4	1.9	.9	1.4	.0	− .6	1.7	1.7	.2
14	2.0	3.8	3.2	4.9	1.9	.9	1.4	− .1	− .8	1.3	1.8	.4
15	1.8	3.4	3.0	6.2	1.8	.9	1.2	− .1	− .8	1.0	1.7	.5
16	1.7	3.1	2.8	7.9	2.0	.9	1.2	.5	−1.0	.4	1.7	.6
17	1.6	2.9	2.6	6.2	2.0	.8	1.2	1.0	− .6	.3	1.6	.7
18	1.6	2.4	2.3	5.3	1.9	.7	1.1	.5	− .2	1.9	1.6	1.2
19	1.7	2.3	2.3	4.3	1.6	.5	1.0	.5	.0	3.7	1.5	1.6
20	1.6	2.3	2.3	5.3	1.5	.7	.9	.1	.0	4.2	1.4	1.6
21	1.5	2.1	2.6	4.8	1.5	.7	.9	− .3	− .2	2.6	2.0	1.5
22	1.4	2.1	2.5	4.3	1.4	.6	.6	− .5	− .2	2.0	1.8	1.7
23	1.6	2.1	2.3	3.8	1.4	.6	.3	− .5	− .3	1.5	1.6	2.5
24	2.4	2.0	2.3	3.4	1.3	.5	.0	− .7	− .8	1.2	1.6	3.4
25	3.0	2.0	2.2	3.2	1.3	.5	.3	− .7	1.1	.9	1.7	4.1
26	2.5	2.0	2.1	2.8	1.3	.6	1.0	− .7	1.3	1.1	1.8	3.8
27	2.3	2.0	2.4	2.6	1.2	.4	1.0	− .6	1.0	1.0	1.8	5.1
28	2.0	1.8	2.9	2.4	1.1	1.1	.8	− .4	.8	.9	1.6	5.8
29	2.0	.....	2.8	2.4	1.1	1.4	.6	− .4	.6	.7	1.2	4.6
30	2.2	.....	3.0	2.8	1.0	1.6	.2	− .4	.3	.7	1.1	3.4
31	3.0	.....	2.9	.....	1.0	.....	− .3	.0	.....	.6	.....	3.0

TENNESSEE RIVER AT CHATTANOOGA, TENN.

Location.—At Hamilton County highway bridge in the city of Chattanooga, just below Chattanooga Island, 4 miles below South Chickamauga Creek and 3 miles above Chattanooga Creek.

Records available.—January 1, 1879, to December 31, 1911. The United States Weather Bureau began observations of gage heights January 1, 1879. Earlier records beginning in 1875, when the first gage was established are fragmentary. Discharge measurements were first made by the United States Geological Survey in 1897. Gage heights from January 1, 1900, have been published by the United States Geological Survey. A number of discharge measurements made by the United States Weather Bureau in 1893 have also been published by the United States Geological Survey.

Drainage area.—21,400 square miles (published by the United States Weather Bureau).

Gage.—The present standard gage consists of a sloping iron section (railroad T rail) bolted to rock and a vertical timber attached to the rock cliff on the left bank at the foot of Lookout Street, about 200 feet upstream from the bridge. It was erected October 31, 1884. The original gage was established in 1875. An automatic recording gage, which makes its record in the Weather Bureau office, has been used for several years. There is also a vertical section of brass gage attached to the pier nearest the left bank, and recently half-foot graduations have been painted on the pipe incasing the recording gage float, to be read from the bridge with the aid of a glass. The datum has remained the same for all of the gages.

Channel.—Permanent or nearly so, though a portion of the bed is sand. Current good.

Discharge measurements.—Made from downstream footway of bridge; elevation about 100 feet above water.

Floods.—The flood of March 11, 1867, reached a height of about 58.0 feet by the gage datum (information from United States Weather Bureau).

Point of zero flow.—Reports of the United States engineers show that the bottom of the excavated boat channel at Ross Towhead, 2½ miles below the gage, is about 5 feet lower than gage datum, which indicates that there would be no flow past the gage if the stage were to fall to about −5.0 feet.

Winter flow.—Ice does not appreciably affect the flow.

Artificial control.—None probably at present. A large dam for lock and power plant about 20 miles below will, when completed, raise the water level at Chattanooga, and will entirely destroy the usefulness of the gage heights for estimates of flow.

Accuracy.—Daily gage heights in the following table are as furnished by the United States Weather Bureau and were obtained from the automatic recording gage record with corrections based on periodic readings of the gage painted on the float pipe. The reading of the automatic recording gage has been checked at various times by engineers of the Survey and found to be essentially correct, but on November 25, 1911, a discrepancy of 0.5 foot was noted, the automatic recording gage reading too high by that amount. The discharge measurements made by Survey engineers are referred to the cliff or float pipe gages, to which, therefore, the discharge rating curve refers. The accuracy of daily and monthly discharge obtained by applying this rating curve to the automatic recording gage record is questionable and these discharge values should be used with caution. It should be noted, however, that the discrepancy in the published daily discharge for November 24 and 25 as obtained from the Weather Bureau gage heights and the measured discharge on those days is due in part to the difference in the time of the gage readings.

Cooperation.—The daily gage heights have all been furnished by the United States Weather Bureau.

Discharge measurements of Tennessee River at Chattanooga, Tenn., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Nov. 24	R. E. Robertson	[a] 4.20	23,100
25	.....do	[b] 3.90	20,800

[a] Gage height obtained by reducing readings on Weather Bureau recording gage by 0.5 foot.
[b] Gage height as read on Weather Bureau gage on float pipe and found to be 0.5 foot less than recorded by Weather Bureau recording gage.

Daily gage height, in feet, of Tennessee River at Chattanooga, Tenn., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.7	6.5	5.4	7.0	6.8	3.4	3.7	2.6	1.6	2.2	2.8	4.2
2	10.7	7.4	5.2	6.3	9.9	3.3	3.1	2.5	1.6	2.0	2.7	4.0
3	20.5	9.7	5.2	5.9	11.7	3.2	2.7	2.5	2.0	2.0	2.5	3.9
4	24.2	8.5	5.2	5.6	11.6	3.2	2.6	2.5	3.1	2.0	2.4	3.7
5	24.9	7.8	5.0	14.6	9.9	3.1	2.6	3.1	2.8	2.0	2.4	3.5
6	22.9	8.7	4.8	25.3	8.4	3.1	2.3	3.5	2.6	2.0	2.3	3.3
7	18.6	9.3	4.7	28.8	7.4	3.1	2.3	3.4	2.9	2.0	2.4	3.1
8	12.9	9.5	4.7	29.8	6.9	3.0	2.3	3.3	2.9	2.1	2.9	3.0
9	9.5	15.4	11.4	29.9	6.5	3.0	2.3	3.2	3.0	2.6	3.4	2.9
10	8.1	21.7	18.2	27.3	6.0	3.0	2.3	3.2	2.8	2.6	3.9	2.8
11	7.2	23.7	20.0	21.1	5.8	3.2	2.3	3.0	2.6	2.6	4.5	2.7
12	6.5	23.9	16.4	17.0	5.6	3.2	2.9	3.0	2.5	2.7	4.8	2.7
13	6.0	20.6	11.3	15.8	5.4	2.9	3.2	2.6	2.5	3.7	5.0	2.7
14	5.6	15.0	9.1	13.8	5.1	2.5	3.2	2.6	2.3	3.9	5.7	2.9
15	5.2	11.4	7.9	12.6	4.8	2.4	3.2	2.4	2.3	3.8	6.0	3.5
16	5.0	9.7	7.2	13.9	4.6	2.3	3.5	2.4	2.2	3.8	5.6	5.3
17	4.7	8.6	6.3	14.7	4.4	2.2	3.4	2.4	2.1	4.0	5.2	6.7
18	4.6	7.7	5.6	14.8	4.4	2.2	3.4	2.4	2.0	5.6	5.0	6.5
19	4.5	7.1	5.2	14.0	4.4	2.2	3.4	2.7	2.0	6.0	5.0	5.4
20	4.5	6.7	4.9	15.6	4.4	2.2	3.3	2.8	2.1	7.0	5.1	4.8
21	4.5	6.7	4.8	15.9	4.3	2.3	2.9	2.7	2.1	7.2	5.1	4.8
22	4.5	6.7	4.9	14.3	4.3	2.3	2.7	2.4	2.0	7.7	5.0	4.8
23	4.3	6.6	4.9	12.2	4.4	2.4	2.8	2.2	2.0	6.4	5.0	6.4
24	4.3	6.4	4.9	10.7	4.9	2.4	2.9	2.0	2.0	5.0	4.8	8.0
25	4.2	6.3	4.9	9.5	4.8	2.4	5.0	1.9	2.0	4.4	4.5	9.8
26	5.1	6.0	4.9	8.7	4.6	2.4	4.8	1.8	2.0	3.9	4.4	10.2
27	6.0	5.8	5.4	8.0	4.2	2.4	4.9	1.7	2.1	3.8	4.3	14.5
28	5.8	5.6	6.7	7.5	4.0	2.4	3.8	1.6	2.9	3.6	4.3	18.5
29	5.4	.....	7.4	7.1	3.8	2.6	3.2	1.6	2.9	3.3	4.3	18.7
30	5.4	.....	7.4	6.8	3.6	3.5	2.8	1.6	2.4	3.0	4.3	14.6
31	5.9	.....	7.4	.....	3.5	.....	2.7	1.6	.....	2.9	.....	13.1

NOTE.—See "Accuracy" in station description.

Daily discharge, in second-feet, of Tennessee River at Chattanooga, Tenn., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	25,400	36,500	29,600	39,700	38,400	18,100	19,700	14,000	9,490	12,100	15,000	22,500
2	64,300	42,300	28,400	35,200	58,900	17,600	16,500	13,600	9,490	11,200	14,500	21,400
3	131,000	57,600	28,400	32,700	71,000	17,000	14,500	13,600	11,200	11,200	13,600	20,800
4	156,000	49,600	28,400	30,800	70,300	17,000	14,000	13,600	16,500	11,200	13,100	19,700
5	161,000	45,000	27,200	90,700	58,900	16,500	14,000	16,500	15,000	11,200	13,100	18,600
6	147,000	50,900	26,000	163,000	48,900	16,500	12,600	18,600	14,000	11,200	12,600	17,600
7	118,000	54,900	25,400	187,000	42,300	16,500	12,600	18,100	15,500	11,200	13,100	16,500
8	79,100	56,200	25,400	194,000	39,000	16,000	12,600	17,600	15,500	11,700	15,500	16,000
9	56,200	96,100	69,000	195,000	36,500	16,000	12,600	17,000	16,000	14,000	18,100	15,500
10	47,000	139,000	115,000	177,000	33,300	16,000	12,600	17,000	15,000	14,000	20,800	15,000
11	41,000	153,000	127,000	135,000	32,100	17,000	12,600	16,000	14,000	14,000	24,300	14,500
12	36,500	154,000	103,000	107,000	30,800	17,600	15,500	16,000	13,600	14,500	26,000	14,500
13	33,300	131,000	68,300	98,800	29,600	15,500	17,000	14,000	13,600	19,700	27,200	14,500
14	30,800	93,400	53,600	85,200	27,800	13,600	17,000	14,000	12,600	20,800	31,400	15,500
15	28,400	69,000	45,600	77,100	26,000	13,100	17,000	13,100	12,600	20,300	33,300	18,600
16	27,200	57,600	41,000	85,900	24,800	12,600	18,600	13,100	12,100	20,300	30,800	29,000
17	25,400	50,300	35,200	91,400	23,700	12,100	18,100	13,100	11,700	21,400	28,400	37,800
18	24,800	44,300	30,800	92,000	23,700	12,100	18,100	13,100	11,200	30,800	27,200	36,500
19	24,300	40,400	28,400	86,600	23,700	12,100	18,100	14,500	11,200	33,300	27,200	29,600
20	24,300	37,800	26,600	97,500	23,700	12,100	17,600	15,000	11,700	39,700	27,800	26,000
21	24,300	37,800	26,000	99,500	23,100	12,600	15,500	14,500	11,700	41,000	27,800	26,000
22	24,300	37,800	26,600	88,600	23,100	12,600	14,500	13,100	11,200	44,300	27,200	26,000
23	23,100	37,100	26,600	74,400	23,700	13,100	15,000	12,100	11,200	35,800	27,200	35,800
24	23,100	35,800	26,600	64,300	26,600	13,100	15,500	11,200	11,200	27,200	26,000	46,300
25	22,500	35,200	26,600	56,200	26,000	13,100	27,200	10,800	11,200	23,700	24,300	58,300
26	27,800	33,300	26,600	50,900	24,800	13,100	26,000	10,300	11,200	20,800	23,700	60,900
27	33,300	32,100	29,600	46,300	22,500	13,100	26,600	9,900	11,700	20,300	23,100	90,000
28	32,100	30,800	37,800	43,000	21,400	13,100	20,300	9,490	15,500	19,200	23,100	117,000
29	29,600	.....	42,300	40,400	20,300	14,000	17,000	9,490	15,500	17,600	23,100	118,000
30	29,600	.....	42,300	38,400	19,200	18,600	15,000	9,490	13,100	16,000	23,100	90,700
31	32,700	.....	42,300	.....	18,600	.....	14,500	9,490	.....	15,500	.....	80,500

NOTE.—Daily discharge determined from a rating curve well defined between 8,050 and 37,100 second-feet (gage heights 1.2 and 6.6 feet), fairly well defined between 37,800 and 86,600 second-feet (gage heights 6.7 and 14.0 feet), and poorly defined above 86,600 second-feet (gage height 14.0 feet). The discharge rating curve is based on five measurements made during 1910 and 1911 and the form of the 1909 rating curve. See "Accuracy" in station description.

Monthly discharge of Tennessee River at Chattanooga, Tenn., for 1911.

[Drainage area, 21,400 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	161,000	22,500	51,100	2.39	2.76	C.
February	154,000	30,800	62,100	2.90	3.02	C.
March	127,000	25,400	42,400	1.98	2.28	B.
April	195,000	30,800	90,100	4.21	4.70	C.
May	71,000	18,600	32,700	1.53	1.76	B.
June	18,600	12,100	14,700	.687	.77	B.
July	27,200	12,600	16,700	.780	.90	B.
August	18,600	9,490	13,600	.636	.73	B.
September	16,500	9,490	12,800	.598	.67	B.
October	44,300	11,200	20,500	.958	1.10	B.
November	33,300	12,600	22,700	1.06	1.18	B.
December	118,000	14,500	37,700	1.76	2.03	C.
The year	195,000	9,490	34,500	1.61	21.90	

SOUTH FORK OF HOLSTON RIVER AT BLUFF CITY, TENN.

Location.—At highway bridge at Bluff City, Tenn., 300 feet below Virginia & Southwestern Railway bridge, 1 mile below the mouth of Indian Creek, and about 10 miles above the mouth of Watauga River.

Records available.—July 17, 1900, to December 31, 1911.

Drainage area.—828 square miles.

Gage.—Vertical staff attached to downstream side of bridge pier nearest the right bank; datum unchanged since established.

Channel.—Very irregular in depth and velocity of current; surface height controlled by shallow ledge below; probably permanent.

Discharge measurements.—Made from downstream side of the bridge. Also made from the railroad bridge 300 feet above, where the section is much better except at low stages when the current there becomes sluggish.

Winter flow.—Ice does not affect the flow. A few days the observer has reported "Frozen," but this has probably referred to the water at the foot of gage rather than in the channel.

Cooperation.—Since January 1, 1905, the gage heights have been furnished by the United States Weather Bureau.

Discharge measurements of South Fork of Holston River at Bluff City, Tenn., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Nov. 29	R. E. Robertson	1.20	734
29	.....do	1.20	711

NOTE.—Both discharge measurements were made from the Virginia & Southwestern Railway bridge.

Daily gage height, in feet, of South Fork of Holston River at Bluff City, Tenn., for 1911

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.4	4.0	1.5	2.3	2.9	0.7	0.8	0.1	0.6	0.2	0.4	1.0
2	4.1	3.3	1.5	2.1	2.7	.8	.5	.5	.4	.3	.4	1.0
3	5.1	2.9	1.5	1.9	2.3	.7	.5	1.4	.3	1.3	.3	.9
4	5.4	2.8	1.3	2.0	2.1	.7	.5	1.3	.2	1.5	.3	.9
5	3.8	2.9	1.2	3.7	1.9	.7	.7	.9	.4	.8	.2	.8
6	2.9	2.9	3.0	6.1	1.8	2.9	1.1	.5	.5	.5	.3	.8
7	2.4	2.4	3.6	5.2	1.7	1.5	.7	.3	.6	.4	1.0	.7
8	2.1	2.4	7.8	3.8	1.6	1.3	1.0	.3	.4	.3	1.3	.7
9	1.8	5.7	5.1	5.1	1.6	1.0	1.7	.5	.3	.3	1.1	.7
10	1.7	6.7	3.9	4.7	1.5	.8	1.3	.4	.1	.4	1.2	.6
11	1.6	4.7	3.4	3.7	1.5	.8	2.3	.3	.7	.6	1.1	.6
12	1.5	3.7	3.0	3.2	1.4	.7	2.1	.3	1.9	.7	1.0	.6
13	1.4	3.2	2.6	2.9	1.4	.7	1.7	.3	.9	.6	1.4	.6
14	1.4	2.7	2.5	2.5	1.6	.6	1.0	.3	.6	.5	1.4	.6
15	1.4	2.6	2.3	3.2	1.6	.6	.9	.3	.4	.4	1.3	.5
16	1.4	2.4	2.1	4.3	1.4	.6	.8	.4	.3	.6	1.1	.7
17	1.3	2.2	1.9	3.5	1.4	.5	.7	.5	.3	.4	1.0	.9
18	1.3	2.0	1.9	3.1	1.2	.5	.6	.4	.2	2.8	1.1	.8
19	1.3	2.0	1.9	2.6	1.2	.8	.6	.3	.3	2.4	1.8	.7
20	1.2	2.0	2.5	3.3	1.2	1.0	.6	.3	.4	1.8	1.7	.6
21	1.2	1.9	2.3	3.1	1.1	.9	.5	.2	.3	1.4	1.6	.7
22	1.5	1.9	2.1	2.8	1.1	.8	.5	.2	.3	1.0	1.3	.7
23	5.3	1.9	2.1	2.5	1.0	.6	.5	.2	.3	.9	1.1	2.2
24	3.7	1.9	1.9	2.3	1.1	.6	.4	.2	.3	.8	1.2	2.4
25	2.9	1.8	1.8	2.1	1.0	.7	.7	.2	.3	.7	1.6	2.9
26	2.5	1.7	1.8	2.0	.9	.6	.5	.2	.3	.7	1.3	2.6
27	2.5	1.6	2.0	1.9	.8	.6	.4	.3	.3	.6	1.2	2.9
28	2.6	1.5	2.6	1.8	.8	.7	.3	.3	.2	.6	1.2	2.7
29	2.8	.....	2.5	1.8	.7	1.5	.3	.2	.2	.5	1.2	2.2
30	3.6	.....	2.5	1.7	.7	1.9	.2	.2	.2	.5	1.1	2.0
31	5.8	.....	2.5	.....	.7	.....	.1	.3	.....	.5	.....	1.9

Daily discharge, in second-feet, of South Fork of Holston River at Bluff City, Tenn., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,900	4,060	1,020	1,790	2,500	475	530	212	420	245	325	650
2	4,220	3,040	1,020	1,580	2,250	530	370	370	325	285	325	650
3	5,990	2,500	1,020	1,380	1,790	475	370	940	285	860	285	590
4	6,580	2,370	860	1,480	1,580	475	370	860	245	1,020	285	590
5	3,760	2,500	785	3,610	1,380	475	475	590	325	530	245	530
6	2,500	2,500	2,630	8,050	1,280	2,500	715	370	370	370	285	530
7	1,900	1,900	3,460	6,180	1,190	1,020	475	285	420	325	650	475
8	1,580	1,900	12,000	3,760	1,100	860	650	285	325	285	860	475
9	1,280	7,200	5,990	5,990	1,100	650	1,190	370	285	285	715	475
10	1,190	9,410	3,910	5,260	1,020	530	860	325	212	325	785	420
11	1,100	5,260	3,180	3,610	1,020	530	1,790	285	475	420	715	420
12	1,020	3,610	2,630	2,900	940	475	1,580	285	1,380	475	650	420
13	940	2,900	2,130	2,500	940	475	1,190	285	590	420	940	420
14	940	2,250	2,010	2,010	1,100	420	650	285	420	370	940	420
15	940	2,130	1,790	2,900	1,100	420	590	285	325	325	860	370
16	940	1,900	1,580	4,560	940	420	530	325	285	420	715	475
17	860	1,680	1,380	3,320	940	370	475	370	285	325	650	590
18	860	1,480	1,380	2,760	785	370	420	325	245	2,370	715	530
19	860	1,480	1,380	2,130	785	530	420	285	285	1,900	1,280	475
20	785	1,480	2,010	3,040	785	650	420	285	325	1,280	1,190	420
21	785	1,380	1,790	2,760	715	590	370	245	285	940	1,100	475
22	1,020	1,380	1,580	2,370	715	530	370	245	285	650	860	475
23	6,380	1,380	1,580	2,010	650	420	370	245	285	590	715	1,680
24	3,610	1,380	1,380	1,790	715	420	325	245	285	530	785	1,900
25	2,500	1,280	1,280	1,580	650	475	475	245	285	475	1,100	2,500
26	2,010	1,190	1,280	1,480	590	420	370	245	285	475	860	2,130
27	2,010	1,100	1,480	1,380	530	420	325	285	285	420	785	2,500
28	2,130	1,020	2,130	1,280	530	475	285	285	245	420	785	2,250
29	2,370	.....	2,010	1,280	475	1,020	285	245	245	370	785	1,680
30	3,460	.....	2,010	1,190	475	1,380	245	245	245	370	715	1,480
31	7,410	.....	2,010	.....	475	.....	212	285	.....	370	.....	1,380

NOTE.—Daily discharge computed from a rating curve fairly well defined below 3,320 second-feet (gage height 3.5 feet).

Monthly discharge of South Fork of Holston River at Bluff City, Tenn., for 1911.

[Drainage area, 828 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	7,410	785	2,380	2.87	3.31	B.
February	9,410	1,020	2,560	3.09	3.22	B.
March	12,000	785	2,280	2.75	3.17	B.
April	8,050	1,190	2,860	3.45	3.85	B.
May	2,500	475	1,000	1.21	1.40	B.
June	2,500	370	627	.757	.84	B.
July	1,790	212	571	.690	.80	B.
August	940	212	337	.407	.47	C.
September	1,380	212	352	.425	.47	C.
October	2,370	245	595	.719	.83	B.
November	1,280	245	730	.882	.98	B.
December	2,500	370	915	1.11	1.28	B.
The year	12,000	212	1,260	1.52	20.62	

HOLSTON RIVER NEAR ROGERSVILLE, TENN.

Location.—At Virginia & Southwestern Railway bridge near Austins Mill, a small railroad station, and 3 miles south of Rogersville. Station 150 feet below the mouth of Honeycut Creek and about 2 miles below Dodson Creek, both small streams from the south.

Records available.—March 10, 1902, to December 31, 1911. Gage heights furnished by United States Weather Bureau. Discharge measurements were begun in 1904 by the United States Geological Survey. No gage heights or estimates of flow have been published by the United States Geological Survey prior to January 1, 1904, but it is thought that the 1904 discharge rating curve is applicable to the United States Weather Bureau gage heights back to the beginning.

Drainage area.—3,060 square miles.

Gage.—Vertical staff attached to downstream side of bridge pier nearest the right bank; datum unchanged.

Channel.—Practically permanent; section good for measurements.

Discharge measurements.—Made from top of the high-decked steel railroad bridge. A new highway bridge has recently been built half a mile above. The section at the new bridge appears to be good for measurements, and if it proves so it will be the regular place for future measurements.

Floods.—The flood of January 23 and 24, 1906, reached a maximum height of 17.5 feet by the gage datum. The stage was 15.0 feet on the morning of January 24.

Winter flow.—Ice does not affect the flow to any considerable extent.

Accuracy.—Discharge measurements made November 28, 1911, and June 21, 1912 (before the preparation of this report), indicate a change in the relation of gage height to discharge as expressed by the discharge rating curve used from 1906 to 1910. The last discharge measurement was previously made March 16, 1909. Estimates of discharge for 1911 are based on a new rating curve. Published estimates of discharge for 1910 should be used with caution as noted in the last paragraph of the description of this station in Water-Supply Paper 283. The change may be due to some change in the gage when the bridge was reconstructed during 1910, but this probably does not affect the 1911 data.

Cooperation.—The United States Weather Bureau has maintained the gage and furnished all the gage-height records.

The following discharge measurement was made by R. E. Robertson:

November 28, 1911: Gage height, 2.27 feet; discharge, 2,560 second-feet.

Daily gage height, in feet, of Holston River near Rogersville, Tenn., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.6	5.6	2.5	3.3	4.0	1.8	1.9	1.3	1.6	1.4	1.4	2.1
2	5.1	4.5	2.5	3.2	4.3	1.8	1.8	1.3	1.8	1.4	1.5	2.0
3	7.7	4.0	2.5	3.1	3.8	1.9	1.6	1.3	1.6	1.6	1.4	2.0
4	8.8	4.0	2.4	3.0	3.5	1.8	1.6	1.3	1.5	1.7	1.4	1.9
5	6.4	4.3	2.4	5.0	3.4	1.8	1.6	1.3	1.5	2.4	1.4	1.9
6	4.7	3.9	3.0	8.7	3.2	1.8	1.6	1.6	1.7	1.9	1.4	1.8
7	4.0	3.9	5.4	7.3	3.0	2.8	1.9	1.5	1.8	1.7	2.0	1.8
8	3.6	3.9	11.0	5.8	2.8	2.0	1.8	1.4	1.7	1.5	2.4	1.7
9	3.5	9.5	9.4	5.7	2.7	2.0	2.0	1.8	1.6	1.4	2.4	1.7
10	3.0	8.9	6.0	6.6	2.7	1.9	2.8	1.5	1.6	1.4	2.4	1.6
11	2.8	7.6	5.0	5.5	2.6	1.9	2.2	1.3	1.5	1.9	2.3	1.5
12	2.7	5.4	4.3	4.7	2.6	1.8	2.6	1.2	1.5	2.1	2.1	1.5
13	2.5	4.6	4.0	4.3	2.5	1.6	2.7	1.7	1.9	2.1	2.4	1.5
14	2.4	4.2	3.8	4.0	2.5	1.6	2.3	1.7	1.8	1.9	2.5	1.5
15	2.4	3.8	3.6	5.0	2.7	1.6	2.2	1.4	1.7	1.7	2.4	1.5
16	2.4	3.7	3.4	6.0	2.6	1.5	2.0	1.5	1.6	1.5	2.3	1.5
17	2.4	3.6	3.3	5.0	2.4	1.5	1.9	1.5	1.5	1.6	2.1	1.7
18	2.4	3.2	3.2	4.4	2.4	1.5	1.8	1.5	1.5	3.0	2.4	1.8
19	2.4	3.2	3.0	4.0	2.5	1.5	1.8	1.5	1.5	4.7	2.5	1.8
20	2.4	3.1	3.2	4.1	2.3	1.5	1.7	1.5	1.5	3.3	2.7	1.6
21	2.4	3.1	3.6	4.4	2.3	1.7	1.7	1.5	1.5	2.6	2.6	1.8
22	2.4	3.0	3.3	4.0	2.3	1.8	1.6	1.5	1.4	2.2	2.3	1.8
23	4.0	2.9	3.3	3.9	2.2	1.8	1.5	1.5	1.5	2.1	2.2	3.1
24	5.0	2.8	3.2	3.6	2.2	1.7	1.4	1.4	1.5	2.0	2.4	3.7
25	4.0	2.7	3.0	3.4	2.1	1.6	1.4	1.4	1.5	2.0	2.7	3.9
26	3.5	2.6	2.8	3.2	2.0	1.8	1.4	1.4	1.5	1.9	2.6	4.0
27	3.2	2.5	3.1	3.0	2.0	2.0	1.4	1.4	1.4	1.7	2.4	4.7
28	3.2	2.5	3.7	2.8	1.9	1.9	1.4	1.4	1.4	1.6	2.3	4.6
29	3.6	.....	3.7	2.8	1.9	1.9	1.4	1.5	1.4	1.4	2.3	4.0
30	3.9	.....	3.5	3.2	1.9	2.1	1.3	1.5	1.4	1.4	2.1	3.4
31	7.1	.....	3.4	.....	1.8	.....	1.3	1.5	.....	1.4	.....	3.4

Daily discharge, in second-feet, of Holston River near Rogersville, Tenn., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5,930	13,000	3,000	5,050	7,150	1,570	1,760	680	1,210	850	850	2,150
2	11,000	8,800	3,000	4,770	8,120	1,570	1,570	680	1,570	850	1,030	1,950
3	21,400	7,150	3,000	4,500	6,530	1,760	1,210	680	1,210	1,210	850	1,950
4	25,800	7,150	2,780	4,230	5,630	1,570	1,210	680	1,030	1,390	850	1,760
5	16,200	8,120	2,780	10,600	5,340	1,570	1,210	680	1,030	2,780	850	1,760
6	9,490	6,840	4,230	25,400	4,770	1,570	1,210	1,210	1,390	1,760	850	1,570
7	7,150	6,840	12,200	19,800	4,230	3,720	1,760	1,030	1,570	1,390	1,950	1,570
8	5,930	6,840	34,600	13,800	3,720	1,950	1,570	850	1,390	1,030	2,780	1,390
9	5,630	28,600	28,200	13,400	3,470	1,950	1,950	1,570	1,210	850	2,780	1,390
10	4,230	26,200	14,600	17,000	3,470	1,760	3,720	1,030	1,210	850	2,780	1,210
11	3,720	21,000	10,600	12,600	3,230	1,760	2,350	680	1,030	1,760	2,560	1,030
12	3,470	12,200	8,120	9,490	3,230	1,570	3,230	515	1,030	2,150	2,150	1,030
13	3,000	9,140	7,150	8,120	3,000	1,210	3,470	1,390	1,760	2,150	2,780	1,030
14	2,780	7,790	6,530	7,150	3,000	1,210	2,560	1,390	1,570	1,760	3,000	1,030
15	2,780	6,530	5,930	10,600	3,470	1,210	2,350	850	1,390	1,390	2,780	1,030
16	2,780	6,230	5,340	14,600	3,230	1,030	1,950	1,030	1,210	1,030	2,560	1,030
17	2,780	5,930	5,050	10,600	2,780	1,030	1,760	1,030	1,030	1,210	2,150	1,390
18	2,780	4,770	4,770	8,460	2,780	1,030	1,570	1,030	1,030	4,230	2,780	1,570
19	2,780	4,770	4,230	7,150	3,000	1,030	1,570	1,030	1,030	9,490	3,000	1,570
20	2,780	4,500	4,770	7,470	2,560	1,030	1,390	1,030	1,030	5,050	3,470	1,210
21	2,780	4,500	5,930	8,460	2,560	1,390	1,390	1,030	1,030	3,230	3,230	1,570
22	2,780	4,230	5,050	7,150	2,560	1,570	1,210	1,030	850	2,350	2,560	1,570
23	7,150	3,970	5,050	6,840	2,350	1,570	1,030	1,030	1,030	2,150	2,350	4,500
24	10,600	3,720	4,770	5,930	2,350	1,390	850	850	1,030	1,950	2,780	6,230
25	7,150	3,470	4,230	5,340	2,150	1,210	850	850	1,030	1,950	3,470	6,840
26	5,630	3,230	3,720	4,770	1,950	1,570	850	850	1,030	1,760	3,230	7,150
27	4,770	3,000	4,500	4,230	1,950	1,950	850	850	850	1,390	2,780	9,490
28	4,770	3,000	6,230	3,720	1,760	1,760	850	850	850	1,210	2,560	9,140
29	5,930	.....	6,230	3,720	1,760	1,760	850	1,030	850	850	2,560	7,150
30	6,840	.....	5,630	4,770	1,760	2,150	680	1,030	850	850	2,150	5,340
31	19,000	.....	5,340	.....	1,570	.....	680	1,030	.....	850	.....	5,340

NOTE.—Daily discharge computed from a rating curve fairly well defined between 1,030 and 12,600 second-feet (gage heights, 1.5 and 5.5 feet), and assumed a tangent above 10,600 second-feet (gage height, 5.0 feet). See "Accuracy," in station description.

Monthly discharge of Holston River near Rogersville, Tenn., for 1911.

[Drainage area, 3,060 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	25,800	2,780	7,090	2.32	2.68	B.
February	28,600	3,000	8,270	2.70	2.81	C.
March	34,600	2,780	7,340	2.40	2.77	C.
April	25,400	3,720	8,990	2.94	3.28	B.
May	8,120	1,570	3,400	1.11	1.28	B.
June	3,720	1,030	1,580	.516	.58	B.
July	3,720	680	1,600	.523	.60	B.
August	1,570	515	951	.311	.36	B.
September	1,760	850	1,140	.373	.42	B.
October	9,490	850	1,990	.650	.75	B.
November	3,470	850	2,350	.768	.86	A.
December	9,490	1,030	3,000	.980	1.13	B.
The year	34,600	515	3,940	1.29	17.52	

DOE RIVER AT BLEVINS, TENN.

Location.—At Eastern Tennessee & Western North Carolina Railroad bridge, one-fourth mile west of Blevins, Tenn., 4½ miles above the mouth of Little Doe River.

Records available.—December 16 to 31, 1911.

Drainage area.—62.2 square miles.

Gage.—Standard chain gage attached to bridge.

Channel.—Bottom sandy; may shift.

Discharge measurements.—Made from upstream side of bridge or by wading at section about one-fourth mile above bridge.

Winter flow.—The relation of gage height to discharge may be occasionally affected by ice, but only for short periods during unusually severe winters.

Accuracy.—Sufficient data have not been obtained to permit estimates of discharge to be made.

Discharge measurements of Doe River at Blevins, Tenn., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Dec. 9	A. H. Horton	1.74	31.9
23	do	2.19	146

Daily gage height, in feet, of Doe River at Blevins, Tenn., for 1911.

[C. A. Johnson, observer.]

Day.	Dec.	Day.	Dec.	Day.	Dec.
1		11		21	1.90
2		12		22	2.11
3		13		23	2.18
4		14		24	2.18
5		15		25	2.19
6		16	1.98	26	2.18
7		17	1.82	27	2.22
8		18	1.78	28	2.10
9		19	1.78	29	2.08
10		20	1.77	30	2.00
				31	2.20

DOE RIVER AT VALLEY FORGE, TENN.

Location.—At Eastern Tennessee & Western North Carolina Railroad bridge at Valley Forge, about 4 miles above the mouth of the river.

Records available.—December 11 to December 31, 1911.

Drainage area.—132 square miles.

Gage.—Standard chain gage attached to bridge.

Channel.—Bottom sandy, may shift.

Discharge measurements.—Made from the upstream side of the bridge or by wading at a section about 40 feet above the bridge. The direction of the current makes a decided angle with the bridge.

Winter flow.—Ice may affect the relation of gage height to discharge for short periods, but only during unusually severe winters.

Accuracy.—Sufficient data have not been obtained to permit estimates of discharge to be made.

Discharge measurements of Doe River at Valley Forge, Tenn., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Dec. 9	A. H. Horton	1.17	71.6
23	.....do	1.81	278

Daily gage height, in feet, of Doe River at Valley Forge, Tenn., for 1911.

[W. C. Garrison, observer.]

Day.	Dec.	Day.	Dec.	Day.	Dec.
1		11	1.16	21	1.30
2		12	1.15	22	1.38
3		13	1.15	23	1.76
4		14	1.15	24	1.70
5		15	1.18	25	1.64
6		16	1.38	26	1.76
7		17	1.38	27	1.95
8		18	1.28	28	1.76
9		19	1.18	29	1.55
10		20	1.18	30	1.58
				31	1.71

LITTLE TENNESSEE RIVER AT JUDSON, N. C.

Location.—At Southern Railway bridge one-fourth mile north of the Southern Railway station at Judson, 2½ miles below the mouth of Nantahala River, 1 mile below Alarka Creek, one-fourth mile below Sawyer Branch, and 3 miles above the mouth of Tuckasegee River.

Records available.—June 25, 1896, to December 31, 1911.

Drainage area.—675 square miles.

Gage.—The present gage is a vertical staff in two sections on right bank 100 feet above the bridge. Lower section bolted to rock; upper section on tree. This gage superseded the chain gage on the bridge on July 1, 1905. The staff gage set to read the same as the chain gage at stage 3.0 feet, but owing to slope of water surface its datum was raised 0.5 foot. The original gage was first a wire gage, but afterwards a boxed chain gage was used. Although the continuity of the record was interrupted by broken wires and stolen chains the datum of the original gage was not changed.

Channel.—Rough, rocky bottom; section divided by two piers. Current swift and irregular.

Discharge measurements.—Made from downstream side of railroad bridge. Some recent measurements have been made at a trestle for small flume crossing the river about one-fourth mile above the gage, where the section is better.

Winter flow.—Not affected by ice.

Accuracy.—Relation of gage height to discharge does not appear permanent, probably because of moving of bowlders at and below the station during floods, when current is very swift. No discharge measurements above about 3,000 second-feet have been made in recent years, and values in the following table of daily discharge above that point should be used with caution.

Discharge measurements of Little Tennessee River at Judson, N. C., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Aug. 9	R. E. Robertson	3.15	1,020
9	do	3.13	1,040

Daily gage height, in feet, of Little Tennessee River at Judson, N. C., for 1911.

[Miss E. G. Enloe, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.5	3.1	3.7	4.2	4.8	2.9	2.9	2.9	3.5	3.0	3.2	3.8
2	4.5	3.1	3.7	4.8	4.7	2.9	3.0	3.0	3.0	3.0	3.2	3.7
3	7.9	3.9	3.6	5.3	4.6	3.3	3.0	5.5	2.9	3.0	3.2	3.7
4	6.0	3.95	3.5	10.1	4.6	3.3	2.9	4.0	3.1	2.9	3.15	3.6
5	4.5	3.9	3.9	9.5	4.5	3.3	2.9	3.5	3.0	2.9	3.3	3.5
6	4.3	3.9	3.9	8.3	4.5	3.3	2.8	3.5	4.0	2.9	3.3	3.5
7	4.2	3.85	4.0	7.0	4.3	3.3	2.8	3.5	3.5	2.9	4.4	3.5
8	4.2	4.5	4.0	6.8	4.1	3.2	2.8	3.2	3.0	2.8	3.6	3.5
9	4.15	5.0	3.9	7.5	4.0	3.2	3.8	3.2	3.0	2.8	5.0	3.5
10	4.1	4.5	3.9	7.0	3.9	3.2	3.5	3.0	2.95	3.2	4.4	3.45
11	3.95	4.4	4.0	6.9	3.9	3.2	3.3	3.0	2.9	4.7	4.0	3.5
12	3.95	4.4	3.9	6.8	3.9	3.2	3.2	3.0	2.9	4.0	3.6	3.5
13	3.9	4.1	3.8	6.4	3.9	3.1	3.0	3.0	3.0	3.2	4.4	3.5
14	3.9	4.1	3.7	6.4	3.9	3.1	3.0	3.0	3.0	3.1	4.2	3.5
15	3.8	4.0	3.5	6.0	3.9	3.1	3.0	2.9	3.3	3.1	4.0	3.6
16	3.8	4.0	3.5	6.3	3.8	3.1	3.0	2.9	3.3	3.0	3.8	4.1
17	3.7	3.9	3.4	6.0	3.8	3.1	2.9	2.9	3.0	3.4	3.8	4.1
18	3.6	3.9	3.4	5.9	3.8	3.1	3.0	2.8	2.9	7.4	4.9	3.8
19	3.6	3.85	3.5	5.9	3.8	3.1	3.0	2.8	2.9	6.9	4.4	3.6
20	3.4	3.85	3.5	5.7	3.8	3.0	3.3	2.7	2.9	4.9	4.1	4.1
21	3.4	3.8	3.4	5.6	3.9	3.0	3.5	2.7	2.9	4.0	4.0	5.2
22	3.3	3.8	3.4	5.5	3.5	3.0	3.2	2.7	3.0	3.8	3.8	6.9
23	3.3	3.7	3.4	5.5	3.7	3.0	3.0	2.7	3.0	3.7	3.8	5.6
24	3.3	3.6	3.3	5.4	3.8	3.0	3.0	2.6	3.9	3.6	4.1	5.6
25	3.2	3.6	3.3	5.2	3.8	3.8	3.0	2.6	4.0	3.5	4.0	5.4
26	3.2	4.0	4.0	5.0	3.8	3.8	3.0	2.6	4.6	3.5	3.8	5.8
27	3.2	3.8	3.9	4.9	3.8	3.9	2.9	2.5	3.35	3.45	3.8	7.2
28	3.2	3.8	3.6	4.9	3.1	3.9	2.9	2.5	3.2	3.4	3.9	6.6
29	3.2	.....	5.0	4.8	3.1	3.0	2.9	2.5	3.1	3.35	4.2	5.6
30	3.1	.....	4.8	4.8	3.0	3.0	2.9	2.6	3.05	3.3	4.0	5.0
31	3.1	.....	4.7	.....	3.0	.....	2.9	4.0	.....	3.3	.....	6.8

Daily discharge, in second-feet, of Little Tennessee River at Judson, N. C., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,370	1,000	1,590	2,190	3,170	850	850	850	1,370	925	1,080	1,700
2	2,640	1,000	1,590	3,170	2,990	850	925	925	925	925	1,080	1,590
3	11,900	1,820	1,480	4,160	2,810	1,170	925	4,610	850	925	1,080	1,590
4	5,900	1,880	1,370	20,100	2,810	1,170	850	1,940	1,000	850	1,040	1,480
5	2,640	1,820	1,820	17,800	2,640	1,170	850	1,370	925	850	1,170	1,370
6	2,330	1,820	1,820	13,300	2,640	1,170	780	1,370	1,940	850	1,170	1,370
7	2,190	1,760	1,940	8,930	2,330	1,170	780	1,370	1,370	850	2,480	1,370
8	2,190	2,640	1,940	8,310	2,060	1,080	780	1,080	925	780	1,480	1,370
9	2,120	3,550	1,820	10,600	1,940	1,080	1,700	1,080	925	780	3,550	1,370
10	2,060	2,640	1,820	8,930	1,820	1,080	1,370	925	888	1,080	2,480	1,320
11	1,880	2,480	1,940	8,620	1,820	1,080	1,170	925	850	2,990	1,940	1,370
12	1,880	2,480	1,820	8,310	1,820	1,080	1,080	925	850	1,940	1,480	1,370
13	1,820	2,060	1,700	7,070	1,820	1,000	925	925	925	1,080	2,480	1,370
14	1,820	2,060	1,590	7,070	1,820	1,000	925	925	925	1,000	2,190	1,370
15	1,700	1,940	1,370	5,900	1,820	1,000	925	850	1,170	1,000	1,940	1,480
16	1,700	1,940	1,370	6,770	1,700	1,000	925	850	1,170	925	1,700	2,060
17	1,590	1,820	1,270	5,900	1,700	1,000	850	850	925	1,270	1,700	2,060
18	1,480	1,820	1,270	5,630	1,700	1,000	925	780	850	10,200	3,360	1,700
19	1,480	1,760	1,370	5,630	1,700	1,000	925	780	850	8,620	2,480	1,480
20	1,270	1,760	1,370	5,100	1,700	925	1,170	715	850	3,360	2,060	2,060
21	1,270	1,700	1,270	4,850	1,820	925	1,370	715	850	1,940	1,940	3,950
22	1,170	1,700	1,270	4,610	1,370	925	1,080	715	925	1,700	1,700	8,620
23	1,170	1,590	1,270	4,610	1,590	925	925	715	925	1,590	1,700	4,850
24	1,170	1,480	1,170	4,380	1,700	925	925	650	1,820	1,480	2,060	4,850
25	1,080	1,480	1,170	3,950	1,700	1,700	925	650	1,940	1,370	1,940	4,380
26	1,080	1,940	1,940	3,550	1,700	1,700	925	650	2,810	1,370	1,700	5,360
27	1,080	1,700	1,820	3,360	1,700	1,820	850	585	1,220	1,320	1,700	9,570
28	1,080	1,700	1,480	3,360	1,000	1,820	850	585	1,080	1,270	1,820	7,690
29	1,080	.....	3,550	3,170	1,000	925	850	585	1,000	1,220	2,190	4,850
30	1,000	.....	3,170	3,170	925	925	850	650	962	1,170	1,940	3,550
31	1,000	.....	2,990	.....	925	.....	850	1,940	.....	1,170	.....	8,310

NOTE.—Daily discharge determined by means of a discharge rating curve that is fairly well defined below 2,990 second-feet (gage height 4.7 feet) and poorly defined above that point.

Monthly discharge of Little Tennessee River at Judson, N. C., for 1911.

[Drainage area, 675 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	11,900	1,000	2,070	3.07	3.54	B.
February	3,550	1,000	1,900	2.81	2.93	B.
March	3,550	1,170	1,720	2.55	2.94	B.
April	20,100	2,190	6,750	10.0	11.16	C.
May	3,170	925	1,880	2.79	3.22	B.
June	1,820	850	1,120	1.66	1.85	A.
July	1,700	780	969	1.44	1.66	A.
August	4,610	585	1,050	1.56	1.80	A.
September	2,810	850	1,130	1.67	1.86	A.
October	10,200	780	1,830	2.71	3.12	B.
November	3,550	1,040	1,890	2.80	3.12	B.
December	9,570	1,320	3,120	4.62	5.33	B.
The year	20,100	585	2,110	3.13	42.53	

NOTE.—See footnote to table of daily discharge and discussion under "Accuracy" in station description.

LITTLE TENNESSEE RIVER AT McGHEE, TENN.

Location.—At Louisville & Nashville Railroad bridge, one-third mile south of McGhee and one-half mile below the mouth of Tellico River.

Records available.—November 29, 1904, to December 31, 1911.

Drainage area.—2,470 square miles.

Gage.—Chain gage on crossties, upstream side of the railroad bridge, owned by United States Weather Bureau. Prior to December 1, 1905, the same gage was on the old railroad bridge 1,000 feet below. The present datum is 0.3 foot higher than the original datum, allowing for slope in river measured at gage height 4.0 feet.

Channel.—Mostly sand and gravel but practically permanent.

Discharge measurements.—Made from the downstream side of the railroad bridge.

Floods.—The flood of February 22, 1906, reached a height of 22.2 feet by the gage datum. The United States Weather Bureau reports a height of 39.0 feet March, 1867, and 38.5 feet in 1884.

Point of zero flow.—Report of the United States Engineers shows the controlling ledge below the gage to be about 2.5 feet lower than low water at the gage. Assuming their low water to be the same as lowest records places the point of zero flow at about − 0.3 foot by the gage datum.

Winter flow.—Ice does not affect the flow.

Cooperation.—Gage-height records have been furnished by the United States Weather Bureau.

Discharge measurements of Little Tennessee River at McGhee, Tenn., in 1911.

Date.	Hydrographer.	Gage height.	dis-charge.
		Feet.	*Sec.-feet.*
Aug. 4	R. E. Robertson	4.15	6,150
Nov. 3	.....do	2.60	2,200

Daily gage height, in feet, of Little Tennessee River at McGhee, Tenn., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.1	3.9	3.7	4.4	5.3	3.3	2.9	2.6	3.4	2.5	2.6	3.3
2	8.1	3.7	4.2	4.2	5.0	3.4	2.7	2.9	2.9	2.4	2.6	3.2
3	10.9	3.6	4.0	4.1	4.7	3.2	2.7	3.2	2.6	2.5	2.5	3.1
4	12.2	4.0	3.8	4.0	4.5	3.2	2.8	3.8	2.5	2.6	2.5	3.0
5	7.4	4.5	3.7	8.0	4.4	3.1	3.2	4.0	2.7	2.6	2.5	3.0
6	5.5	4.3	3.7	14.4	4.3	3.7	3.0	3.6	3.0	2.4	2.5	2.9
7	5.1	4.3	4.8	9.3	4.3	3.3	2.9	3.1	3.8	2.4	3.7	2.9
8	4.8	4.4	4.6	9.0	4.2	3.2	2.7	3.1	3.1	2.3	3.6	2.9
9	4.6	11.2	4.9	9.0	4.1	3.2	3.0	3.5	2.9	2.3	3.5	2.9
10	4.3	8.8	4.5	7.8	4.1	3.1	4.3	3.1	2.7	2.4	4.2	2.8
11	4.1	6.5	4.6	6.7	4.0	3.1	3.2	2.8	2.7	3.7	3.8	2.8
12	3.9	5.7	4.4	6.6	4.0	3.0	3.2	2.8	3.0	3.6	4.2	2.9
13	3.9	5.3	4.2	7.3	4.0	2.9	3.1	2.2	2.8	3.0	4.2	2.9
14	3.8	5.0	4.1	6.7	3.8	2.9	3.6	2.9	2.7	2.6	3.9	2.9
15	3.7	4.8	4.0	6.7	3.8	2.8	3.2	3.0	2.5	2.6	3.6	3.0
16	3.7	4.6	3.8	7.0	.....	2.8	3.0	3.2	2.5	2.5	3.5	3.2
17	3.6	4.4	3.7	6.2	.....	2.8	3.9	2.9	2.6	2.8	3.3	3.6
18	3.6	4.3	3.7	5.7	.....	2.9	3.7	2.7	2.6	9.8	3.6	3.5
19	3.8	4.2	3.7	5.5	.....	3.0	3.2	3.3	2.5	5.0	4.6	3.1
20	3.7	4.2	4.2	9.1	3.7	3.2	2.9	2.8	2.5	4.0	4.0	3.0
21	3.7	4.0	4.1	7.0	3.7	3.5	2.9	2.6	2.5	3.6	3.8	3.4
22	3.6	4.0	3.9	6.2	4.1	3.0	3.9	2.5	2.8	3.4	3.6	4.4
23	3.6	3.9	3.9	5.8	3.8	3.0	3.4	2.5	2.7	3.3	3.3	7.2
24	3.6	3.9	3.8	5.5	4.0	3.0	3.1	2.4	2.5	3.2	3.5	5.5
25	3.4	3.8	3.8	5.2	3.8	2.9	6.3	2.4	3.2	3.0	3.9	5.5
26	3.4	3.8	3.7	5.0	3.7	2.9	4.1	2.4	3.3	2.9	3.5	5 0
27	3.4	3.8	5.2	4.8	3.5	2.8	3.3	2.6	2.9	2.9	3.2	10 2
28	3.4	3.7	5.5	4.8	3.4	3.4	3.0	2.6	2.7	2.8	3.3	8.4
29	3.5	.....	4.8	4.8	3.4	3.8	2.9	2.6	2.6	2.8	3.2	5.9
30	3.9	.....	4.5	4.7	3.3	3.1	2.8	2.4	2.5	2.8	3.4	5.2
31	4.3	.....	4.5	.....	3.2	.....	2.8	2.4	.....	2.7	.....	5.4

Daily discharge, in second-feet, of Little Tennessee River at McGhee, Tenn., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5,680	5,150	4,630	6,500	9,120	3,650	2,790	2,250	3,890	2,090	2,250	3,650
2	17,800	4,630	5,950	5,950	8,220	3,890	2,420	2,790	2,790	1,940	2,250	3,420
3	27,400	4,380	5,410	5,680	7,350	3,420	2,420	3,420	2,250	2,090	2,090	3,200
4	32,100	5,410	4,890	5,410	6,780	3,420	2,600	4,890	2,090	2,250	2,090	2,990
5	15,600	6,780	4,630	17,500	6,500	3,200	3,420	5,410	2,420	2,250	2,090	2,990
6	9,720	6,220	4,630	40,300	6,220	4,630	2,990	4,380	2,990	1,940	2,090	2,790
7	8,520	6,220	7,640	21,800	6,220	3,650	2,790	3,200	4,890	1,940	4,630	2,790
8	7,640	6,500	7,060	20,800	5,950	3,420	2,420	3,200	3,200	1,790	4,380	2,790
9	7,060	28,400	7,930	20,800	5,680	3,420	2,990	4,130	2,790	1,790	4,130	2,790
10	6,220	20,200	6,780	16,900	5,680	3,200	6,220	3,200	2,420	1,940	5,950	2,600
11	5,680	12,800	7,060	13,400	5,410	3,200	3,420	2,600	2,420	4,630	4,890	2,600
12	5,150	10,300	6,500	13,100	5,410	2,990	3,420	2,600	2,990	4,380	5,950	2,790
13	5,150	9,120	5,950	15,300	5,410	2,790	3,200	1,650	2,600	2,990	5,950	2,790
14	4,890	8,220	5,680	13,400	4,890	2,790	4,380	2,790	2,420	2,250	5,150	2,790
15	4,630	7,640	5,410	13,400	4,890	2,600	3,420	2,990	2,090	2,250	4,380	2,990
16	4,630	7,060	4,890	14,300	4,840	2,600	2,990	3,420	2,090	2,090	4,130	3,420
17	4,380	6,500	4,630	11,800	4,780	2,600	5,150	2,790	2,250	2,600	3,650	4,380
18	4,380	6,220	4,630	10,300	4,730	2,790	4,630	2,420	2,250	23,500	4,380	4,130
19	4,890	5,950	4,630	9,720	4,680	2,990	3,420	3,650	2,090	8,220	7,060	3,200
20	4,630	5,950	5,950	21,200	4,630	3,420	2,790	2,600	2,090	5,410	5,410	2,990
21	4,630	5,410	5,680	14,300	4,630	4,130	2,790	2,250	2,090	4,380	4,890	3,890
22	4,380	5,410	5,150	11,800	5,680	2,990	5,150	2,090	2,600	3,890	4,380	6,500
23	4,380	5,150	5,150	10,600	4,890	2,990	3,890	2,090	2,420	3,650	3,650	15,000
24	4,380	5,150	4,890	9,720	5,410	2,990	3,200	1,940	2,090	3,420	4,130	9,720
25	3,890	4,890	4,890	8,820	4,890	2,790	12,200	1,940	3,420	2,990	5,150	9,720
26	3,890	4,890	4,630	8,220	4,630	2,790	5,680	1,940	3,650	2,790	4,130	8,220
27	3,890	4,890	8,820	7,640	4,130	2,600	3,650	2,250	2,790	2,790	3,420	24,900
28	3,890	4,630	9,720	7,640	3,890	3,890	2,990	2,250	2,420	2,600	3,650	18,800
29	4,130	.....	7,640	7,640	3,890	4,890	2,790	2,250	2,250	2,600	3,420	10,900
30	5,150	.....	6,780	7,350	3,650	3,200	2,600	1,940	2,090	2,600	3,890	8,820
31	6,220	.....	6,780	.....	3,420	.....	2,600	1,940	.....	2,420	.....	9,420

NOTE.—Daily discharge determined by means of a discharge rating curve fairly well defined between 1,390 and 1,650 second-feet (gage heights 2.0 and 2.2 feet), well defined between 1,790 and 8,820 second-feet (gage heights 2.3 and 5.2 feet), and fairly well defined between 9,120 and 24,200 second-feet (gage heights 5.3 and 10.0 feet). Daily discharge interpolated May 16 to 19.

Monthly discharge of Little Tennessee River at McGhee, Tenn., for 1911.

[Drainage area, 2,470 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	32,100	3,890	7,580	3.07	3.54	B.
February	28,400	4,380	7,650	3.10	3.23	B.
March	9,720	4,630	5,970	2.42	2.79	A.
April	40,300	5,410	13,000	5.26	5.87	B.
May	9,120	3,420	5,370	2.17	2.50	B.
June	4,890	2,600	3,260	1.32	1.47	A.
July	12,200	2,420	3,720	1.51	1.74	A.
August	5,410	1,650	2,810	1.14	1.31	A.
September	4,890	2,090	2,630	1.06	1.18	A.
October	23,500	1,790	3,630	1.47	1.70	A.
November	7,060	2,090	4,120	1.67	1.86	A.
December	24,900	2,600	6,060	2.45	2.82	B.
The year	40,300	1,650	5,470	2.21	30.01	

TUCKASEGEE RIVER AT BRYSON, N. C.

Location.—At highway bridge in the town of Bryson, half a mile below the mouth of Deep Creek and about 15 miles above the junction of Tuckasegee River with Little Tennessee River.

Records available.—November 7, 1897, to December 31, 1911.

Drainage area.—662 square miles.

Gage.—Vertical staff attached to the right bank bridge pier; datum unchanged.

Channel.—Permanent, or nearly so, as to relation of gage height to discharge, though sandy at section.

Discharge measurements.—Made from the downstream side of the bridge.

Winter flow.—Ice does not affect the relation of gage height to discharge.

Accuracy.—Excellent for low and ordinary stages; discharge rating curves not so well defined for high stages, depending upon one discharge measurement made in 1901.

Discharge measurements of Tuckasegee River at Bryson, N. C., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Aug. 8	R. E. Robertson	1.80	1,330
9	do	1.45	877

Daily gage height, in feet, of Tuckasegee River at Bryson, N. C., for 1911.

[J. M. Welch, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.35	1.6	1.85	1.9	2.4	1.65	1.25	1.20	1.45	1.15	1.20	1.38
2	3.95	1.6	1.8	1.9	2.15	1.55	1.30	1.45	1.28	1.18	1.20	1.38
3	5.5	1.5	1.7	1.8	2.15	1.5	1.25	1.95	1.22	1.25	1.20	1.40
4	3.9	2.05	1.65	3.1	2.1	1.45	1.50	2.00	1.25	1.28	1.20	1.45
5	2.9	1.8	2.5	6.9	2.1	1.45	1.40	1.70	1.22	1.15	1.25	1.38
6	2.4	1.85	2.3	4.6	2.05	1.45	1.28	1.48	1.75	1.10	1.55	1.35
7	2.2	1.8	2.45	3.75	2.0	1.4	1.25	1.40	1.35	1.10	1.70	1.32
8	2.1	2.9	2.45	3.5	1.9	1.5	1.25	1.70	1.20	1.10	1.42	1.30
9	2.0	2.95	2.35	3.4	1.9	1.4	1.85	1.38	1.25	1.12	2.00	1.30
10	1.85	2.7	2.3	3.05	1.9	1.4	1.60	1.30	1.25	1.90	1.65	1.30
11	1.8	2.55	2.15	2.75	1.9	1.4	1.50	1.30	1.35	1.90	1.55	1.30
12	1.8	2.3	2.0	3.4	1.8	1.35	1.48	1.30	1.25	1.45	1.75	1.35
13	1.8	2.1	1.9	3.3	1.8	1.3	1.40	1.40	1.15	1.25	1.80	1.30
14	1.7	2.1	1.9	3.25	1.8	1.3	1.80	1.38	1.15	1.28	1.60	1.30
15	1.7	2.0	1.8	3.25	1.75	1.3	1.70	1.35	1.15	1.20	1.55	1.45
16	1.6	1.95	1.75	3.05	1.7	1.3	1.75	1.40	1.15	1.15	1.50	1.80
17	1.6	1.9	1.7	2.75	1.7	1.3	1.60	1.30	1.10	3.60	1.45	1.70
18	1.7	1.9	1.7	2.5	1.75	1.4	1.45	1.20	1.15	2.80	2.15	1.48
19	1.6	1.8	1.85	3.1	1.75	1.45	1.30	1.20	1.15	1.90	1.80	1.42
20	1.6	2.3	1.9	3.1	1.7	1.5	1.42	1.15	1.18	1.70	1.60	1.50
21	1.6	1.95	1.8	2.75	1.85	1.4	1.60	1.10	1.40	1.50	1.60	1.70
22	1.6	1.85	1.7	2.65	1.7	1.3	1.55	1.10	1.22	1.60	1.50	2.60
23	1.6	1.8	1.9	2.45	1.65	1.35	1.32	1.10	1.38	1.55	1.55	2.60
24	1.5	1.8	1.75	2.4	1.8	1.3	1.70	1.10	1.50	1.38	1.80	2.35
25	1.5	1.75	1.7	2.35	1.65	1.3	1.80	1.10	1.42	1.40	1.60	2.25
26	1.55	1.7	2.0	2.3	1.6	1.25	1.45	1.25	1.38	1.32	1.50	2.70
27	1.55	1.7	2.8	2.2	1.6	1.3	1.32	1.22	1.22	1.30	1.50	4.20
28	1.6	1.7	2.25	2.2	1.6	2.15	1.28	1.15	1.18	1.30	1.50	2.80
29	1.6	.....	2.2	2.2	1.6	1.4	1.25	1.10	1.15	1.25	1.60	2.35
30	1.9	.....	2.1	2.7	1.5	1.3	1.20	1.65	1.15	1.25	1.48	2.20
31	1.7	.....	1.95	.....	1.5	.....	1.20	1.85	.....	1.22	.....	3.60

Daily discharge, in second-feet, of Tuckasegee River at Bryson, N. C., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,220	1,090	1,440	1,510	2,300	1,160	678	625	900	578	625	818
2	5,670	1,090	1,360	1,510	1,890	1,020	730	900	709	606	625	818
3	10,700	960	1,220	1,360	1,890	960	678	1,580	646	678	625	840
4	5,540	1,740	1,160	3,670	1,810	900	960	1,660	678	709	625	900
5	3,250	1,360	2,480	18,400	1,810	900	840	1,220	646	578	678	818
6	2,300	1,440	2,130	7,530	1,740	900	709	936	1,300	530	1,020	785
7	1,970	1,360	2,390	5,160	1,660	840	678	840	785	530	1,220	752
8	1,810	3,250	2,390	4,560	1,510	960	678	1,220	625	530	864	730
9	1,660	3,360	2,220	4,330	1,510	840	1,440	818	678	548	1,660	730
10	1,440	2,850	2,130	3,560	1,510	840	1,090	730	678	1,510	1,160	730
11	1,360	2,570	1,890	2,950	1,510	840	960	730	785	1,510	1,020	730
12	1,360	2,130	1,660	4,330	1,360	785	936	730	678	900	1,300	785
13	1,360	1,810	1,510	4,110	1,360	730	840	840	578	678	1,360	730
14	1,220	1,810	1,510	4,000	1,360	730	1,360	818	578	709	1,090	730
15	1,220	1,660	1,360	4,000	1,300	730	1,220	785	578	625	1,020	900
16	1,090	1,580	1,300	3,560	1,220	730	1,300	840	578	578	960	1,360
17	1,090	1,510	1,220	2,950	1,220	730	1,090	730	530	4,800	900	1,220
18	1,220	1,510	1,220	2,480	1,300	840	900	625	578	3,050	1,890	936
19	1,090	1,360	1,440	3,670	1,300	900	730	625	578	1,510	1,360	864
20	1,090	2,130	1,510	3,670	1,220	960	864	578	606	1,220	1,090	960
21	1,090	1,580	1,360	2,950	1,440	840	1,090	530	840	960	1,090	1,220
22	1,090	1,440	1,220	2,760	1,220	730	1,020	530	646	1,090	960	2,660
23	1,090	1,360	1,510	2,390	1,160	785	752	530	818	1,020	1,020	2,660
24	960	1,360	1,300	2,300	1,360	730	1,220	530	900	818	1,360	2,220
25	960	1,300	1,220	2,220	1,160	730	1,360	530	864	840	1,090	2,050
26	1,020	1,220	1,660	2,130	1,090	678	900	678	818	752	960	2,850
27	1,020	1,220	3,050	1,970	1,090	730	752	646	646	730	960	6,350
28	1,090	1,220	2,050	1,970	1,090	1,890	709	578	606	730	960	3,050
29	1,090	.....	1,970	1,970	1,090	840	678	530	578	678	1,090	2,220
30	1,510	.....	1,810	2,850	960	730	625	1,160	578	678	936	1,970
31	1,220	.....	1,580	.....	960	.....	625	1,440	.....	646	.....	4,800

NOTE.—Daily discharge determined by means of a discharge rating curve that is well defined below 3,460 second-feet (gage height, 3.0 feet) and poorly defined above that point.

Monthly discharge of Tuckasegee River at Bryson, N. C., for 1911.

[Drainage area, 662 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	10,700	960	1,960	2.96	3.41	B.
February	3,360	960	1,690	2.55	2.66	A.
March	3,050	1,160	1,690	2.55	2.94	A.
April	18,400	1,360	3,690	5.57	6.21	B.
May	2,300	960	1,400	2.11	2.43	A.
June	1,890	678	866	1.31	1.46	A.
July	1,440	625	917	1.39	1.60	A.
August	1,660	530	823	1.24	1.43	A.
September	1,300	530	702	1.06	1.18	B.
October	4,800	530	1,010	1.53	1.76	A.
November	1,890	625	1,050	1.59	1.77	A.
December	6,350	730	1,590	2.40	2.77	B.
The year	18,400	530	1,450	2.19	29.62	

NOTE.—See footnote to table of daily discharge and discussion under "Accuracy" in station description.

HIWASSEE RIVER AT MURPHY, N. C.

Location.—At highway bridge near the Louisville & Nashville Railroad station, half a mile above the mouth of Valley River.

Records available.—June 26, 1896, to August 8, 1897; October 19, 1897, to December 31, 1911.

Drainage area.—410 square miles.

Gage.—Chain gage attached to downstream side of bridge. Original wire-rope gage was near the same point on bridge. Datum unchanged since October 20, 1897. Record of datum of former gage was lost when wire rope broke August 8, 1897.

Channel.—Permanent; rough; rock bottom at measuring section. Controlling bar below is rock and gravel of less permanent nature. Rebuilding railroad bridge piers 80 feet downstream has also changed channel and relation of gage height to discharge to some extent.

Discharge measurements.—Made from the upstream side of bridge.

Winter flow.—Ice does not affect the relation of gage height to discharge.

Discharge measurements of Hiwassee River at Murphy, N. C., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Aug. 10	R. E. Robertson	5.20	343
10	.....do	5.27	381

Daily gage height, in feet, of Hiwassee River at Murphy, N. C., for 1911.

[Miss Willie Mingus, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.8	5.75	5.8	5.9	6.05	5.6	5.2	5.3	5.3	5.1	5.2	5.4
2	7.4	5.7	6.0	5.85	6.1	5.5	5.3	5.4	5.15	5.05	5.2	5.4
3	8.8	5.75	6.0	5.8	6.1	5.5	5.25	5.6	5.3	5.15	5.2	5.4
4	7.8	5.8	5.95	5.8	6.05	5.5	5.4	6.6	5.1	5.15	5.2	5.35
5	6.85	5.75	5.85	8.9	6.0	5.45	5.3	5.9	5.1	5.1	5.2	5.3
6	6.4	5.7	5.85	8.8	6.0	5.5	5.3	5.6	5.6	5.05	5.2	5.3
7	6.2	5.85	5.85	7.4	5.95	5.55	5.2	5.4	5.5	5.05	5.7	5.3
8	6.05	6.0	5.85	7.8	5.9	5.6	5.9	5.4	5.25	5.0	5.25	5.3
9	6.05	7.4	5.8	8.5	5.9	5.5	5.9	5.3	5.15	5.05	5.35	5.3
10	5.9	7.2	5.8	7.5	5.8	5.4	5.35	5.3	5.15	5.15	5.7	5.3
11	5.8	6.6	5.75	7.1	5.8	5.4	5.75	5.25	5.2	5.9	5.55	5.3
12	5.8	6.6	5.7	7.7	5.8	5.35	5.85	5.2	5.25	5.4	5.5	5.3
13	5.7	6.5	5.7	7.5	5.75	5.3	5.45	5.2	5.15	5.25	5.9	5.25
14	5.7	6.4	5.7	7.1	5.75	5.3	5.8	5.2	5.15	5.2	5.65	5.25
15	5.6	6.3	5.65	7.0	5.7	5.3	5.5	5.3	5.15	5.2	5.6	5.3
16	5.6	6.1	5.6	6.9	5.7	5.3	5.95	5.4	5.2	5.1	5.5	5.4
17	5.55	6.15	5.6	6.7	5.7	5.3	7.4	5.25	5.1	5.3	5.45	5.5
18	5.8	6.0	5.6	6.6	5.9	5.3	5.7	5.2	5.1	5.7	5.7	5.4
19	5.65	5.9	5.6	6.55	5.75	5.4	5.5	5.2	5.15	5.95	5.7	5.4
20	5.65	6.2	6.15	6.35	5.7	5.7	5.4	5.2	5.25	5.65	5.6	5.4
21	5.6	6.0	5.8	6.75	5.75	5.4	5.4	5.15	5.45	5.5	5.5	6.0
22	5.6	6.0	5.75	6.75	5.8	5.35	5.85	5.15	5.3	5.4	5.45	5.9
23	5.6	5.95	5.75	6.5	6.0	5.3	5.5	5.1	5.2	5.35	5.45	7.0
24	5.55	5.85	5.65	6.45	6.3	5.3	5.4	5.1	5.2	5.3	5.5	6.4
25	5.55	5.8	5.65	6.45	6.8	5.3	5.9	5.1	5.15	5.3	5.5	6.3
26	5.6	5.8	5.7	6.3	5.7	5.3	5.45	5.1	5.1	5.3	5.5	6.2
27	5.6	5.85	6.65	6.2	5.65	5.3	5.35	5.2	5.1	5.25	5.45	7.2
28	5.6	5.8	6.25	6.2	5.8	5.8	5.3	5.1	5.1	5.25	5.4	6.65
29	5.8	.....	6.1	6.25	5.9	5.3	5.25	5.1	5.1	5.2	5.5	6.25
30	5.8	.....	6.1	6.2	5.6	5.25	5.2	5.1	5.1	5.25	5.45	6.05
31	5.75	.....	6.0	.....	5.65	.....	5.2	5.6	.....	5.2	.....	6.55

Daily discharge, in second-feet, of Hiwassee River at Murphy, N. C., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	795	752	795	885	1,020	630	335	405	405	270	335	475
2	2,760	710	975	840	1,070	550	405	475	302	238	335	475
3	5,510	752	975	795	1,070	550	370	630	405	302	335	475
4	3,470	795	930	795	1,020	550	475	1,610	270	302	335	440
5	1,920	752	840	5,730	975	512	405	885	270	270	335	405
6	1,380	710	840	5,510	975	550	405	630	630	238	335	405
7	1,170	840	840	2,760	930	590	335	475	550	238	710	405
8	1,020	975	840	3,470	885	630	885	475	370	205	370	405
9	1,020	2,760	795	4,870	885	550	885	405	302	238	440	405
10	885	2,430	795	2,930	795	475	440	405	302	302	710	405
11	795	1,610	752	2,280	795	475	752	370	335	885	590	405
12	795	1,610	710	3,290	795	440	840	335	370	475	550	405
13	710	1,490	710	2,930	752	405	512	335	302	370	885	370
14	710	1,380	710	2,280	752	405	795	335	302	335	670	370
15	630	1,270	670	2,130	710	405	550	405	302	335	630	405
16	630	1,070	630	1,990	710	405	930	475	335	270	550	475
17	590	1,120	630	1,730	710	405	2,760	370	270	405	512	550
18	795	975	630	1,610	885	405	710	335	270	710	710	475
19	670	885	630	1,550	752	475	550	335	302	930	710	475
20	670	1,170	1,120	1,320	710	710	475	335	370	670	630	475
21	630	975	795	1,800	752	475	475	302	512	550	550	975
22	630	975	752	1,800	795	440	840	302	405	475	512	885
23	630	930	752	1,490	975	405	550	270	335	440	512	2,130
24	590	840	670	1,440	1,270	405	475	270	335	405	550	1,380
25	590	795	670	1,440	1,860	405	885	270	302	405	550	1,270
26	630	795	710	1,270	710	405	512	270	270	405	550	1,170
27	630	840	1,670	1,170	670	405	440	335	270	370	512	2,430
28	630	795	1,220	1,170	795	795	405	270	270	370	475	1,670
29	795	.....	1,070	1,220	885	405	370	270	270	335	550	1,220
30	795	.....	1,070	1,170	630	370	335	270	270	370	512	1,020
31	752	.....	975	.....	670	.....	335	630	.....	335	.....	1,550

NOTE.—Daily discharge computed from a rating curve well defined between 270 and 3,290 second-feet (gage heights 5.1 and 7.7 feet), above which it is poorly defined.

Monthly discharge of Hiwassee River at Murphy, N. C., for 1911.

[Drainage area, 410 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	5,510	590	1,100	2.68	3.09	B.
February	2,760	710	1,110	2.71	2.82	A.
March	1,670	630	844	2.06	2.38	A.
April	5,730	795	2,120	5.17	5.77	A.
May	1,860	630	878	2.14	2.47	A.
June	795	370	488	1.19	1.33	A.
July	2,760	335	627	1.53	1.76	A.
August	1,610	270	435	1.06	1.22	A.
September	630	270	340	.829	.92	B.
October	930	205	402	.980	1.13	A.
November	885	335	532	1.30	1.45	A.
December	2,430	370	787	1.92	2.21	A.
The year	5,730	205	802	1.96	26.55	

HIWASSEE RIVER AT RELIANCE, TENN.

Location.—At Louisville & Nashville Railroad bridge at Reliance, Tenn., 1 mile below the mouth of Lost Creek and 2 miles above Spring Creek.

Records available.—August 17, 1900, to December 31, 1911.

Drainage area.—1,180 square miles.

Gage.—Vertical staff attached to a tree on right bank 150 feet above the bridge. On August 3, 1911, the gage was raised 0.10 foot to agree with the original datum. (See "Accuracy" below.)

Channel.—Section is in a pool above a rock ledge diagonally across the river. At lower end of ledge is a small corn mill with some addition to the natural dam, probably varying in extent.

Discharge measurements.—Made from the downstream side of the bridge.

Winter flow.—Ice does not affect the relation of gage height to discharge.

Artificial control.—None above. The small mill below may affect the low-water flow.

Accuracy.—On August 3 it was found by leveling that the gage had settled 0.10 foot, i. e., the gage read high by that amount. The gage was raised to agree with the original datum. It is probable that this error affected the 1910 daily gage heights as published in Water-Supply Paper 283, but since the same error probably entered into the gage heights of the discharge measurements used to determine the 1910 discharge rating table, the published estimates of daily and monthly discharge for 1910 are probably not in error as a result of the settlement of the gage. Gage heights for 1911 in the following tables have been adjusted to the original datum by reducing those observed prior to August 3 by 0.10 foot.

Discharge measurements of Hiwassee River at Reliance, Tenn., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Aug. 3	R. E. Robertson	1.38	1,140
Nov. 4	do	1.01	692

Daily gage height, in feet, of Hiwassee River at Reliance, Tenn., for 1911.

[C. V. Higdon, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.0	1.9	2.05	2.5	2.3	1.6	1.15	1.3	1.45	0.95	1.1	1.3
2	3.7	1.85	2.5	2.45	2.25	1.55	1.15	1.3	1.15	.9	1.05	1.2
3	6.2	1.75	2.25	1.9	2.25	1.55	1.1	1.4	1.05	.9	1.05	1.2
4	5.1	1.8	2.1	1.9	2.2	1.5	1.2	1.4	1.0	1.0	1.0	1.2
5	3.4	2.0	2.0	3.6	2.15	1.5	1.35	1.35	1.0	.9	1.0	1.2
6	2.75	1.9	1.95	6.2	2.1	1.5	1.2	1.5	1.4	.9	1.05	1.2
7	2.4	1.8	1.95	3.9	2.05	1.55	1.3	1.45	2.0	.85	1.4	1.2
8	2.25	3.4	2.0	4.9	2.0	1.5	1.15	1.3	1.3	.85	1.45	1.2
9	2.25	5.2	2.0	5.9	2.0	1.5	1.5	1.3	1.1	.95	1.4	1.2
10	2.05	4.1	1.95	4.1	2.0	1.45	1.25	1.15	1.05	.95	1.9	1.2
11	2.0	3.1	1.95	3.4	1.95	1.4	1.4	1.15	1.1	1.5	1.4	1.2
12	1.95	2.9	1.85	3.5	1.9	1.4	1.55	1.1	1.15	1.55	1.6	1.2
13	1.85	2.8	1.85	3.3	1.9	1.35	1.65	1.05	1.15	1.2	2.1	1.15
14	1.8	2.6	1.85	3.2	1.85	1.3	1.6	1.2	1.1	1.1	1.6	1.2
15	1.8	2.4	1.85	3.2	1.8	1.3	1.45	1.15	1.0	1.0	1.65	1.25
16	1.75	2.3	1.7	3.2	1.8	1.35	1.5	1.2	1.0	1.0	1.5	1.3
17	1.7	2.25	1.7	2.85	1.8	1.35	1.85	1.25	1.05	1.3	1.4	1.5
18	1.75	2.2	1.7	2.7	1.9	1.4	1.85	1.15	1.0	4.4	1.45	1.4
19	1.8	2.15	1.75	2.8	1.85	1.4	1.45	1.1	1.0	2.2	1.9	1.3
20	1.75	2.3	2.1	4.3	1.8	1.6	1.3	1.1	1.05	1.7	1.6	1.25
21	1.75	2.25	1.95	3.3	1.9	1.8	1.3	1.05	1.1	1.5	1.5	1.5
22	1.7	2.2	1.8	3.0	1.9	1.4	1.55	1.0	1.2	1.35	1.45	1.4
23	1.7	2.15	1.85	2.8	1.95	1.45	1.65	1.0	1.1	1.3	1.35	2.5
24	1.7	2.0	1.8	2.65	2.2	1.3	1.6	1.0	1.05	1.3	1.4	2.3
25	1.75	1.95	1.8	2.35	2.0	1.3	1.55	.95	1.05	1.2	1.55	2.35
26	1.65	1.9	1.8	2.35	1.8	1.25	1.7	.95	1.0	1.15	1.45	2.45
27	1.7	1.9	2.8	2.4	1.75	1.25	1.35	.95	1.0	1.15	1.35	3.8
28	1.7	2.05	2.6	2.35	1.7	1.25	1.25	1.0	.95	1.15	1.35	3.1
29	1.75	.....	2.3	2.35	1.7	1.25	1.2	1.1	.95	1.1	1.35	2.5
30	1.95	.....	2.3	2.35	1.65	1.2	1.2	1.0	.95	1.1	1.4	2.5
31	2.1	.....	2.15	.....	1.6	.....	1.2	1.0	.....	1.1	.....	2.4

NOTE.—See discussion under "Accuracy" in station description.

Daily discharge, in second-feet, of Hiwassee River at Reliance, Tenn., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,260	2,050	2,370	3,460	2,950	1,490	850	1,040	1,260	630	790	1,040
2	7,300	1,950	3,460	3,330	2,830	1,410	850	1,040	850	580	735	910
3	17,600	1,760	2,830	2,050	2,830	1,410	790	1,180	735	580	735	910
4	12,800	1,850	2,480	2,050	2,710	1,330	910	1,180	680	680	680	910
5	6,240	2,260	2,260	6,940	2,600	1,330	1,110	1,110	680	580	680	910
6	4,160	2,050	2,160	17,600	2,480	1,330	910	1,330	1,180	580	735	910
7	3,200	1,850	2,160	8,030	2,370	1,410	1,040	1,260	2,260	535	1,180	910
8	2,830	6,240	2,260	12,000	2,260	1,330	850	1,040	1,040	535	1,260	910
9	2,830	13,200	2,260	16,300	2,260	1,330	1,330	1,040	790	630	1,180	910
10	2,370	8,780	2,160	8,780	2,260	1,260	975	850	735	630	2,050	910
11	2,260	5,230	2,160	6,240	2,160	1,180	1,180	850	790	1,330	1,180	910
12	2,160	4,600	1,950	6,590	2,050	1,180	1,410	790	850	1,410	1,490	910
13	1,950	4,300	1,950	5,900	2,050	1,110	1,580	735	850	910	2,480	850
14	1,850	3,730	1,950	5,560	1,950	1,040	1,490	910	790	790	1,490	910
15	1,850	3,200	1,950	5,560	1,850	1,040	1,260	850	680	680	1,580	975
16	1,760	2,950	1,660	5,560	1,850	1,110	1,330	910	680	680	1,330	1,040
17	1,660	2,830	1,660	4,450	1,850	1,110	1,950	975	735	1,040	1,180	1,330
18	1,760	2,710	1,660	4,010	2,050	1,180	1,950	850	680	9,940	1,260	1,180
19	1,850	2,600	1,760	4,300	1,950	1,180	1,260	790	680	2,710	2,050	1,040
20	1,760	2,950	2,480	9,550	1,850	1,490	1,040	790	735	1,660	1,490	975
21	1,760	2,830	2,160	5,900	2,050	1,850	1,040	735	790	1,330	1,330	1,330
22	1,660	2,710	1,850	4,910	2,050	1,180	1,410	680	910	1,110	1,260	1,180
23	1,660	2,600	1,950	4,300	2,160	1,260	1,580	680	790	1,040	1,110	3,460
24	1,660	2,260	1,850	3,870	2,710	1,040	1,490	680	735	1,040	1,180	2,950
25	1,760	2,160	1,850	3,080	2,260	1,040	1,410	630	735	910	1,410	3,080
26	1,580	2,050	1,850	3,080	1,850	975	1,660	630	680	850	1,260	3,330
27	1,660	2,050	4,300	3,200	1,760	975	1,110	630	680	850	1,110	7,660
28	1,660	2,370	3,730	3,080	1,660	975	975	680	630	850	1,110	5,230
29	1,760	.....	2,950	3,080	1,660	975	910	790	630	790	1,110	3,460
30	2,160	.....	2,950	3,080	1,580	910	910	680	630	790	1,180	3,460
31	2,480	.....	2,600	.....	1,490	.....	910	680	.....	790	.....	3,200

NOTE.—Daily discharge computed from a rating curve well defined between 490 and 3,460 second-feet (gage heights 0.8 and 2.5 feet), and fairly well defined between 3,730 and 6,590 second-feet (gage heights 2.6 and 3.5 feet).

Monthly discharge of Hiwassee River at Reliance, Tenn., for 1911.

[Drainage area, 1,180 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	17,600	1,580	3,230	2.74	3.16	B.
February	13,200	1,760	3,430	2.91	3.03	B.
March	4,300	1,660	2,310	1.96	2.26	B.
April	17,600	2,050	5,860	4.97	5.54	B.
May	2,950	1,490	2,140	1.81	2.09	B.
June	1,850	910	1,210	1.03	1.15	A.
July	1,950	790	1,210	1.03	1.19	A.
August	1,330	630	871	.738	.85	A.
September	2,260	630	830	.703	.78	A.
October	9,940	535	1,210	1.03	1.19	A.
November	2,480	680	1,250	1.06	1.18	A.
December	7,660	850	1,860	1.58	1.82	B.
The year	17,600	535	2,110	1.79	24.24	

OCOEE RIVER AT COPPER HILL, TENN.

Location.—At new highway bridge recently built on site of suspension footbridge, from which discharge measurements were formerly made, in town of Copper Hill, Tenn., one-half mile above the mouth of Fightingtown Creek.

Records available.—March 21, 1903, to December 31, 1911.

Drainage area.—374 square miles.

Gage.—Chain gage attached to upstream side of the bridge, installed August 2, 1911. This gage is near the location of the original sloping gage, a portion of which was cut away for the bridge pier. A temporary vertical staff gage was set September 16, 1910, to read the same as the original sloping gage, and the standard chain gage was set August 2, 1911, to read the same as the temporary gage. The chain gage should, therefore, read the same as the original sloping gage, i. e., both refer to the same datum. On August 2, 1911, a discrepancy of 0.10 foot between the bench mark and the two gages was found by wye levels, the gages being too high by that amount. It has been assumed that the error was made in the original levels and the recorded elevation of the bench mark changed to agree with the gages. The discharge measurements have been referred to the gages, and so the records of discharge need no revision.

Channel.—Is not permanent, but the relation of gage height to discharge has remained fairly constant.

Discharge measurements.—Made from the downstream side of the bridge.

Winter flow.—Ice does not affect the relation of gage height to discharge.

Discharge measurements of Ocoee River at Copper Hill, Tenn., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Aug. 1	R. E. Robertson	0.87	436
2	.....do	.82	429
Nov. 6	.....do	.67	334

Daily gage height, in feet, of Ocoee River at Copper Hill, Tenn., for 1911.

[C. H. Black, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	1.4	2.1	1.2	0.85	0.9	0.7	0.45	0.65	0.7
2	.....	1.3	2.1	1.2	.8	.9	.6	.45	.6	.8
3	.....	1.2	1.95	1.2	.8	1.2	.6	.45	.6	.7
4	.....	1.4	1.9	1.2	.9	1.05	.6	.45	.55	.8
5	.....	.....	1.8	1.15	.95	.9	.7	.45	.55	.7
6	.....	.....	1.8	1.1	.9	.8	1.2	.45	.6	.75
7	.....	2.95	1.75	1.0	1.0	.85	1.1	.45	1.6	.7
8	.....	.....	1.75	1.0	1.1	.9	.75	.48	1.45	.7
9	.....	.....	1.7	1.0	1.4	.75	.65	.50	1.35	.7
10	.....	3.4	1.7	1.0	1.2	.7	1.0	1.3	1.1	.7
11	.....	2.85	1.7	.9	1.65	.7	.9	1.8	.95	.7
12	.....	.....	1.6	.9	1.4	.7	.7	1.4	.85	.7
13	.....	3.2	1.65	.85	1.3	.6	.7	1.0	.7	.7
14	.....	2.8	1.6	.8	1.45	.7	.6	.6	.6	.7
15	.....	2.95	1.5	.9	1.5	.8	.6	.6	.6	.7
16	.....	2.65	1.5	.88	1.4	.7	.6	.6	.7	.85
17	.....	2.5	1.5	1.0	1.3	.7	.55	2.9	.8	.75
18	.....	2.45	1.5	1.1	1.5	.7	.6	2.2	1.9	.75
19	1.55	.....	1.5	1.0	1.4	.7	.8	1.1	1.1	.75
20	1.5	3.6	1.5	1.0	1.4	.7	.95	.85	.9	.8
21	1.3	2.7	1.75	1.0	1.15	.65	.7	.7	.8	1.35
22	1.3	2.45	1.55	.9	1.0	.6	.6	.7	.75	2.8
23	1.3	2.3	1.7	.9	.9	.6	.6	.7	.75	2.4
24	1.25	2.2	1.7	1.0	1.95	.6	.55	.7	.85	1.8
25	1.2	2.15	1.45	1.0	1.9	.6	.6	.65	.9	1.7
26	1.9	2.15	1.3	.9	1.05	.6	.6	.65	.8	3.1
27	2.5	2.0	1.3	.9	.85	.7	.5	.6	.8	3.0
28	1.7	2.1	1.2	.9	.85	.6	.48	.65	.8	3.1
29	1.7	2.15	1.2	.88	.78	.6	.45	.65	1.0	1.6
30	1.7	2.1	1.2	.82	.78	.6	.45	.65	.85	1.7
31	1.5	.....	1.2	.....	.95	1.3	.....	.65	.....	2.5

NOTE.—Gage heights are missing Jan. 1 to Mar. 18 because of inability of observer to read gage, as a result of the fire at the ferry on Dec. 2, 1910. See "Gage" station description.

Daily discharge, in second-feet, of Ocoee River at Copper Hill, Tenn., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	728	1,170	614	436	459	370	274	350	370
2	.....	670	1,170	614	413	459	330	274	330	413
3	.....	614	1,080	614	413	614	330	274	330	370
4	.....	728	1,040	614	459	534	330	274	311	413
5	.....	1,070	977	587	484	459	370	274	311	370
6	.....	1,420	977	560	459	413	614	274	330	392
7	.....	1,760	945	508	508	436	560	274	850	370
8	.....	1,870	945	508	560	459	392	285	758	370
9	.....	1,970	913	508	728	392	350	292	699	370
10	.....	2,080	913	508	614	370	508	670	560	370
11	.....	1,690	913	459	882	370	459	977	484	370
12	.....	1,820	850	459	728	370	370	728	436	370
13	.....	1,940	882	436	670	330	370	508	370	370
14	.....	1,650	850	413	758	370	330	330	330	370
15	.....	1,760	788	459	788	413	330	330	330	370
16	.....	1,550	788	450	728	370	330	330	370	436
17	.....	1,440	788	508	670	370	311	1,720	413	392
18	.....	1,410	788	560	788	370	330	1,240	1,040	392
19	819	1,820	788	508	728	370	413	560	560	392
20	788	2,230	788	508	728	370	484	436	459	413
21	670	1,580	945	508	587	350	370	370	413	699
22	670	1,410	819	459	508	330	330	370	392	1,650
23	670	1,310	913	459	459	330	330	370	392	1,380
24	642	1,240	913	508	1,080	330	311	370	436	977
25	614	1,210	758	508	1,040	330	330	350	459	913
26	1,040	1,210	670	459	534	330	330	350	413	1,860
27	1,440	1,110	670	459	436	370	292	330	413	1,790
28	913	1,170	614	459	436	330	285	350	413	1,860
29	913	1,210	614	450	404	330	274	350	508	850
30	913	1,170	614	422	404	330	274	350	436	913
31	788	.....	614	.....	484	670	.....	350	.....	1,440

NOTE.—Daily discharge computed from a rating curve well defined between 272 and 728 second-feet (gage heights, 0.5 and 1.4 feet) and fairly well defined throughout the remainder of the range of discharge covered by the 1911 gage heights. Daily discharge interpolated Apr. 5, 6, 8, 9, 12, and 19.

Monthly discharge of Ocoee River at Copper Hill, Tenn., for 1911.

[Drainage area, 374 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
March 19–31	1,440	614	837	2.24	1.08	A.
April	2,230	614	1,430	3.82	4.26	B.
May	1,170	614	855	2.29	2.64	A.
June	614	413	503	1.34	1.50	A.
July	1,080	404	610	1.63	1.88	A.
August	670	330	398	1.06	1.22	A.
September	614	274	367	.981	1.09	B.
October	1,720	274	459	1.23	1.42	A.
November	1,040	311	463	1.24	1.38	A.
December	1,860	370	710	1.90	2.19	B.

MISCELLANEOUS MEASUREMENTS.

The following miscellaneous discharge measurements were made in the Ohio River basin during 1911 by M. R. Hall, A. H. Horton, and C. T. Bailey.

Miscellaneous measurements in Ohio River basin in 1911.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.	Drainage area.	Discharge per square mile.
				Feet.	*Sec.-ft.*	*Sq. miles.*	*Sec.-ft.*
July 21	New River....	Kanawha River.	From cable at Grayson, Va., 1 mile below Chestnut Creek.	[a] 1.93	892	1,230	0.72
17	.....do.....	.....do.....	Highway Bridge at Eggleston, Va., 1¼ miles above Stinking Creek.	(b)	1,560	2,920	.53
21	Chestnut Creek.	New River....	Mouth (between Fries Junction and Grayson, Va.).	(c)	19.4	57.6	.34
21	Brush Creek..	.....do.....	.....do.....	(c)	.9	11.3	.08
Mar. 20	Kentucky River.	Ohio River....	Frankfort, Ky.....	[d] 7.9	3,580	[d] 5,140	.70
June 6	East Fork of Little River.	Little River...	Elkmont, Tenn.....	(e)	38	38.5	.99
6	Middle Fork of Little River.	East Fork of Little River (East and Middle Forks form Little River).	Railroad bridge at Forks, about 3 miles above Townsend, Tenn., just above the mouth of Middle Fork and below the mouth of Laurel Creek.	(f)	50	48.5	1.03
5	Little River...	French Broad River.	Foot bridge about three-fourths mile below depot at Townsend, Tenn.	[g] 3.07	114	120	.95
5	.....do.....	.....do.....	Suspension foot bridge at depot at Townsend, Tenn.	[g] 3.07	120	120	1.00
7	.....do.....	.....do.....	Covered railroad bridge of branch road leading to tannery at Walland, Tenn., a short distance above the dam.	(h)	114	183	.62

[a] Vielé, Blackwell, and Buck's gage. (Drowned out by backwater from Appalachian Power Co.'s dam in 1912, before the preparation of this report.)

[b] Water surface 36.00 feet below top of downstream I-bar of upstream pair of I-bars, 22.5 feet from the left pier of highway bridge at Eggleston.

[c] Measurement made with floats to determine inflow to New River between Fries Junction and Grayson, Va.

[d] U. S. Engineer Corps gage at Lock No. 4, about three-fourths mile below Louisville & Nashville R. R. bridge. Daily gage heights and drainage area published by U. S. Weather Bureau. (Flow of Benson Creek immediately below Louisville & Nashville R. R. bridge, zero in this case, included in measurement.

[e] No permanent reference point. Measurement made from foot logs opposite depot at Elkmont at point where an island divides stream into two channels. Both channels of shifting character. Measuring sections rough, and not suitable for accurate determination of discharge.

[f] Water surface 18.85 feet below top of the iron girder, upstream side of bridge, 10 feet from end of girder on left bank.

[g] Water surface 2.93 feet below chisel draft on the top edge of a well-defined ledge of rock under the downstream edge of the suspension bridge at left bank end at Townsend depot. The datum to which the gage heights are referred is 6.00 feet below this chisel draft.

[h] Water surface 28.9 feet below the top of iron plate on top of wooden upper chord at third set of heavy iron hanger rods from right bank end of bridge. Water surface was about 0.3 foot higher at time of measurement, about 8 a. m., than at 6 p. m. the day before.

SUMMARY OF DISCHARGE PER SQUARE MILE.

The following summary of discharge per square mile is given to allow ready comparison of relative rates of run-off from different areas in the Ohio River drainage basin. It shows in a general way the seasonal distribution of run-off and the effect of snow, ground,

surface, and artificial storage. But the most important fact worth noting is the almost entire lack of uniformity or agreement between any two streams. It indicates that the discharge of each stream is a law unto itself, and that all projects dependent upon stream flow, if they are to be developed along the safest and most economical lines, must be based on records of stream flow collected with great care over a long series of years as near the location of the project under consideration as possible.

Summary of discharge, in second-feet per square mile, for river stations in the Ohio River drainage basin in 1911.

	Drainage area.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
	Sq. mi.													
Allegheny River at Redhouse, N. Y.	1,640	5.05	1.72	2.71	3.54	1.19	0.90	0.29	0.99	1.59	1.69	2.50	2.41	2.05
Allegheny River at Kittanning, Pa.	9,010	5.04	2.92	2.10	3.20	1.07	.62	.20	.75	2.44	3.03	2.83	3.16	2.28
Kiskiminetas River at Avonmore, Pa.	1,720	4.62	2.60	2.18	3.60	.73	.69	.23	.36	2.66	2.87	1.57	2.52	2.05
Blacklick Creek at Blacklick, Pa.	386	5.31	2.75	1.89	3.52	.64	.45	.11	.26	2.47	3.45	1.81	2.85	2.12
Tygart River at Belington, W. Va.	390	7.00	2.28	3.67	4.46	.57	.92	.35	.66	2.95	4.51	1.91	2.06	2.62
Tygart River at Fetterman, W. Va.	1,340	5.99	2.16	2.71	4.03	.40	.81	.18	.64	2.85	4.34	1.67	2.33	2.34
West Fork River at Enterprise, W. Va.	750	4.57	1.67	1.71	3.23	.22	.20	.08	.64	2.28	3.09	1.28	2.28	1.77
Cheat River near Morgantown, W. Va.	1,380	6.84	2.58	3.49	4.93	.80	2.01	.46	1.28	3.12	4.67	1.90	3.04	2.93
New River at Radford, Va.	2,720	1.66	1.45	1.50	2.74	1.13	.79	.60	.61	.62	1.05	.69	1.41	1.18
Greenbriar River at Alderson, W. Va.	1,340	5.25	2.17	3.27	4.31	.56	.39	.17	.15	.73	1.94	1.64	1.64	1.85
Miami River at Hamilton, Ohio.	3,580	2.11	1.46	.91	1.90	.96	.30	.23	.16	.36	1.05	.96	1.60	1.00
Dix River near Burgin, Ky.	416	3.10	4.52	.76	2.67	1.94	.20	....	....	....	.53	2.31	6.56	....
Embarrass River near Oakland, Ill.	535	1.02	1.71	.51	2.09	.25	.24	.02	.01	1.17	2.60	1.33	.92	.98
Embarrass River at Ste. Marie, Ill.	1,540	1.42	1.56	1.04	2.02	.51	.15	.08	.06	1.06	1.83	1.24	.94	.99
East Branch of White River at Shoals, Ind.	4,900	2.39	1.96	1.58	3.67	1.24	.34	.16	.09	.68	1.51	1.16	1.75	1.37
Skillet Fork River near Wayne City, Ill.	481	.24	1.18	.45	2.18	1.77	.08	(a)	(a)	.60	.34	.53	.77	.67
French Broad River near Asheville, N. C.	987	1.91	1.56	1.44	3.84	1.65	1.03	.93	.98	1.11	1.61	1.49	2.02	1.55
Tennessee River at Chattanooga, Tenn.	21,400	2.39	2.90	1.98	4.21	1.53	.69	.78	.64	.60	.96	1.06	1.76	1.61
South Fork of Holston River at Bluff City, Tenn.	828	2.87	3.09	2.75	3.45	1.21	.76	.69	.41	.42	.72	.88	1.11	1.52
Holston River near Rogersville, Tenn.	3,060	2.32	2.70	2.40	2.94	1.11	.52	.52	.31	.37	.65	.77	.98	1.29
Little Tennessee River at Judson, N.C.	675	3.07	2.81	2.55	10.0	2.79	1.66	1.44	1.56	1.67	2.71	2.80	4.62	3.13
Little Tennessee River at McGhee, Tenn.	2,470	3.07	3.10	2.42	5.26	2.17	1.32	1.51	1.14	1.06	1.47	1.67	2.45	2.21
Tuckasegee River at Bryson, N. C.	662	2.96	2.55	2.55	5.57	2.11	1.31	1.39	1.24	1.06	1.53	1.59	2.40	2.19
Hiwassee River at Murphy, N. C.	410	2.68	2.71	2.06	5.17	2.14	1.19	1.53	1.06	.83	.98	1.30	1.92	1.96
Hiwassee River at Reliance, Tenn.	1,180	2.74	2.91	1.96	4.97	1.81	1.03	1.03	.74	.70	1.03	1.06	1.58	1.79
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    description 92
    discharge 92
    gage height 92

W.

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  Mount Carmel, Ill.:
    description 68
    gage height 68
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Walker Creek at—
  Staffordsville, Va.:
    description 45
    gage height 46
Walland, Tenn.,
  Little River near:
    discharge 105
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Wayne City, Ill.,
  Skillet Fork River near:
    description 78
    discharge, daily 78, 79
    discharge, monthly 79
    discharge per square mile 106
    gage height 78
Webster Springs, W. Va.,
  Elk River at:
    description 57
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West Fork River at—
  Enterprise, W. Va.:
    description 26–27
    discharge, daily 27, 28
    discharge, monthly 28
    discharge per square mile 106
    gage height 27
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  Shoals, Ind.:
    description 72–73
    discharge, daily 73, 74
    discharge, monthly 74
    discharge per square mile 106
    gage height 73
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  Narrows, Va.:
    description 46
    gage height 47
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Work, division of 14

Y.

Youghiogheny River at—
  Confluence, Pa.:
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    gage height 31

Z.

Zanesville, Ohio—
  Muskingum River at:
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    gage height 34